FIG.1

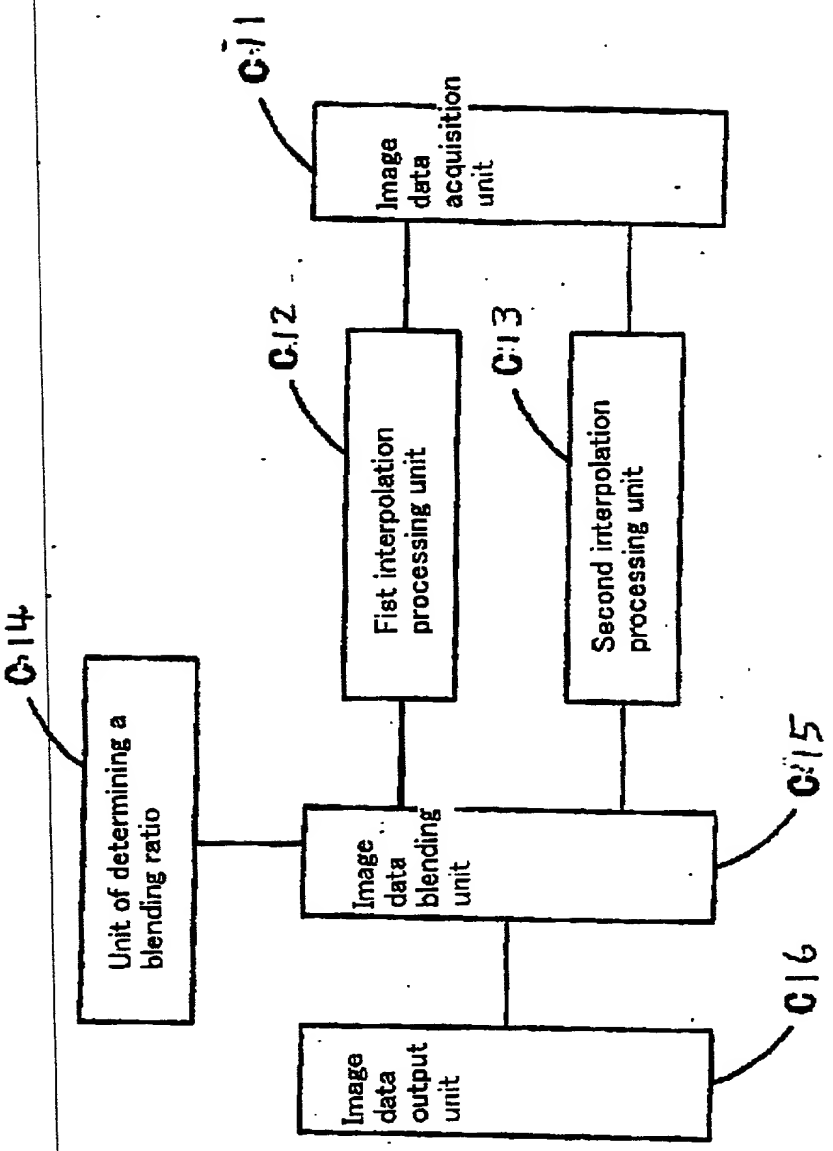

C11
Image data acquisition unit
C12
Fist interpolation processing unit
C13
Second interpolation processing unit
C14
Unit of determining a blending ratio
Image data blending unit
C15
Image data output unit
C16

FIG. 2

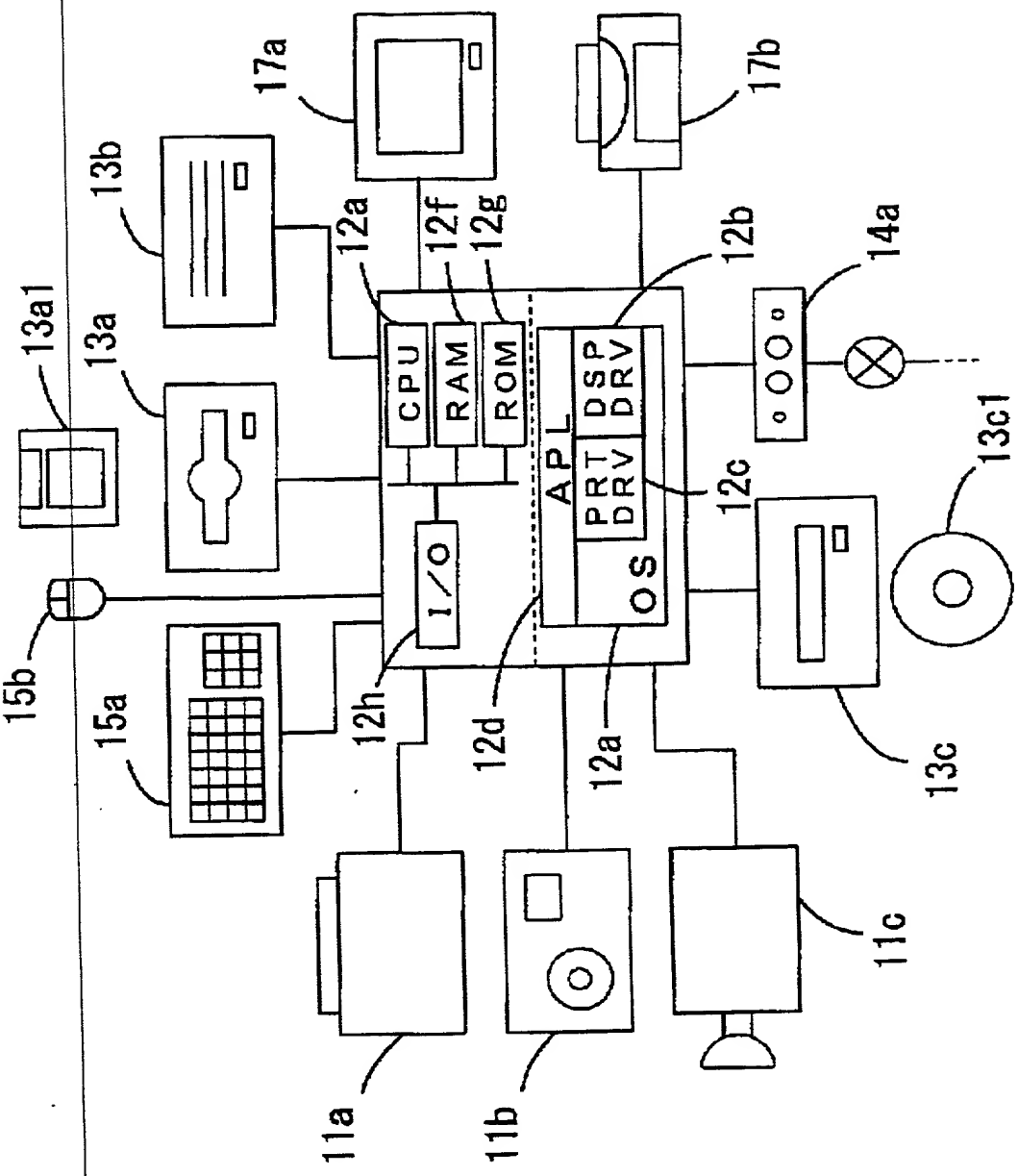

17a
17b
13b
12a
12f
12g
12b
14a
13a1
13a
CPU
RAM
ROM
APL
DSP DRV
PRT DRV
OS
I/O
12c
13c1
15b
15a
12h
12d
12a
13c
11a
11b
11c

FIG.3

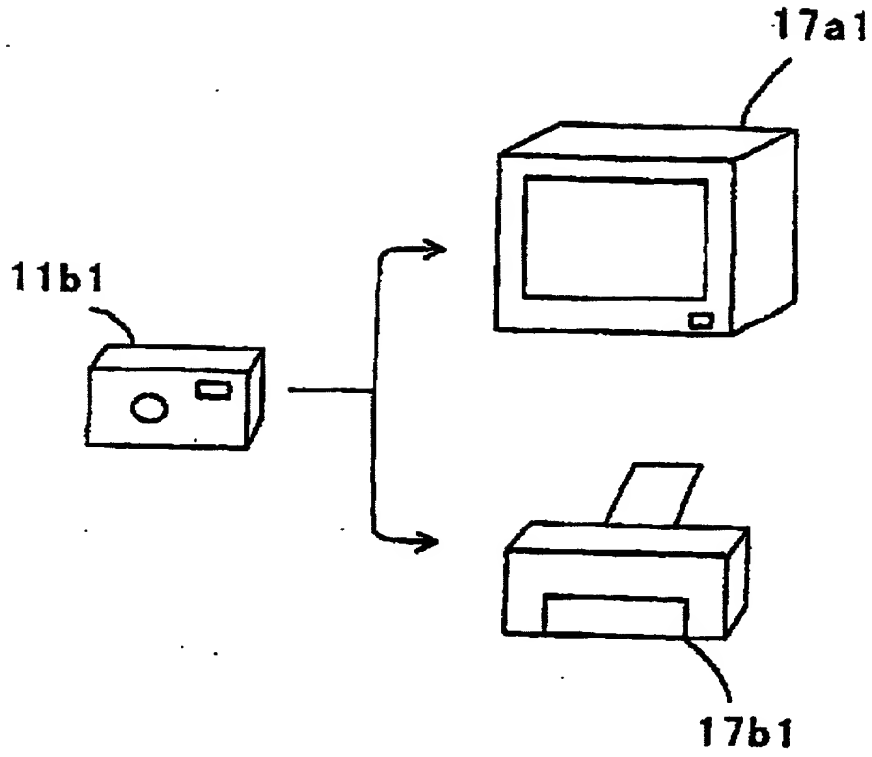


FIG.4

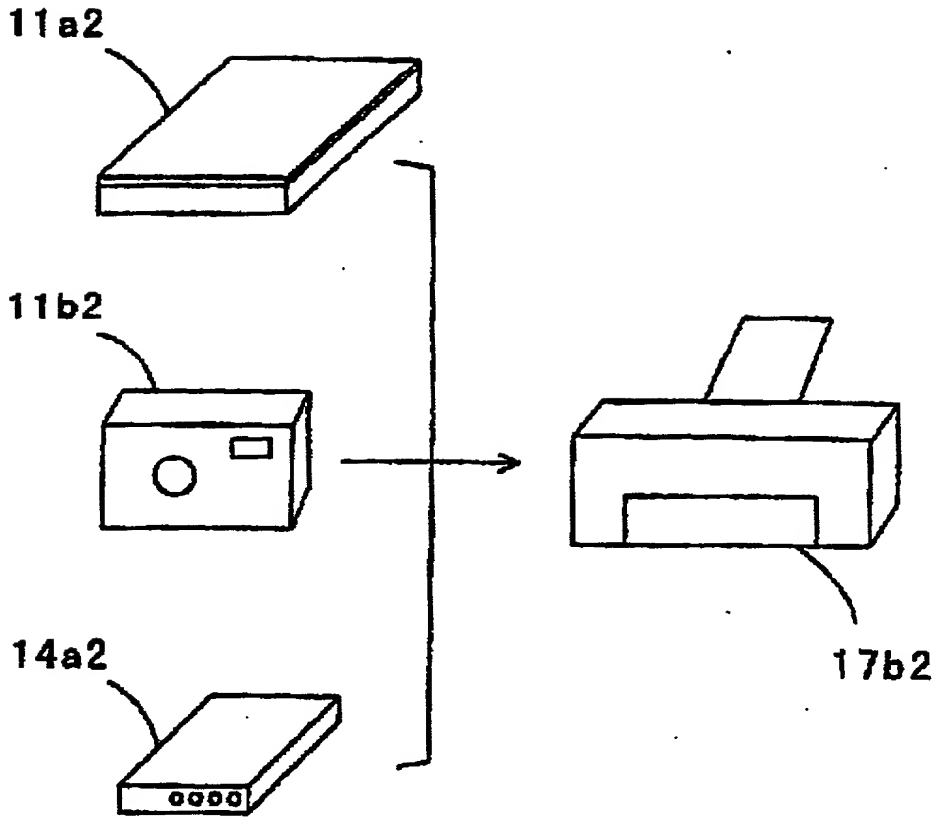


FIG.5

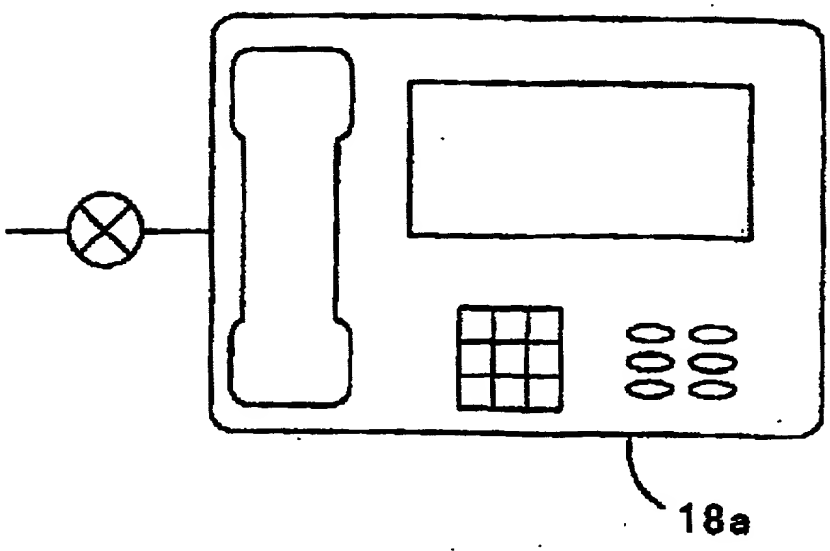


FIG.6

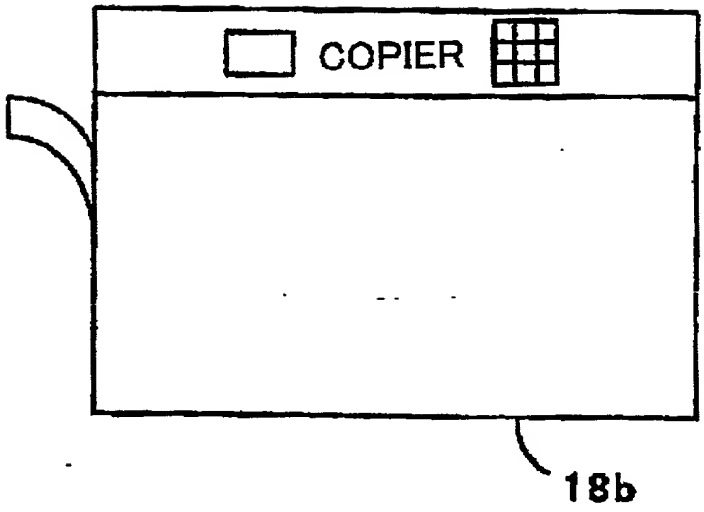


FIG.7

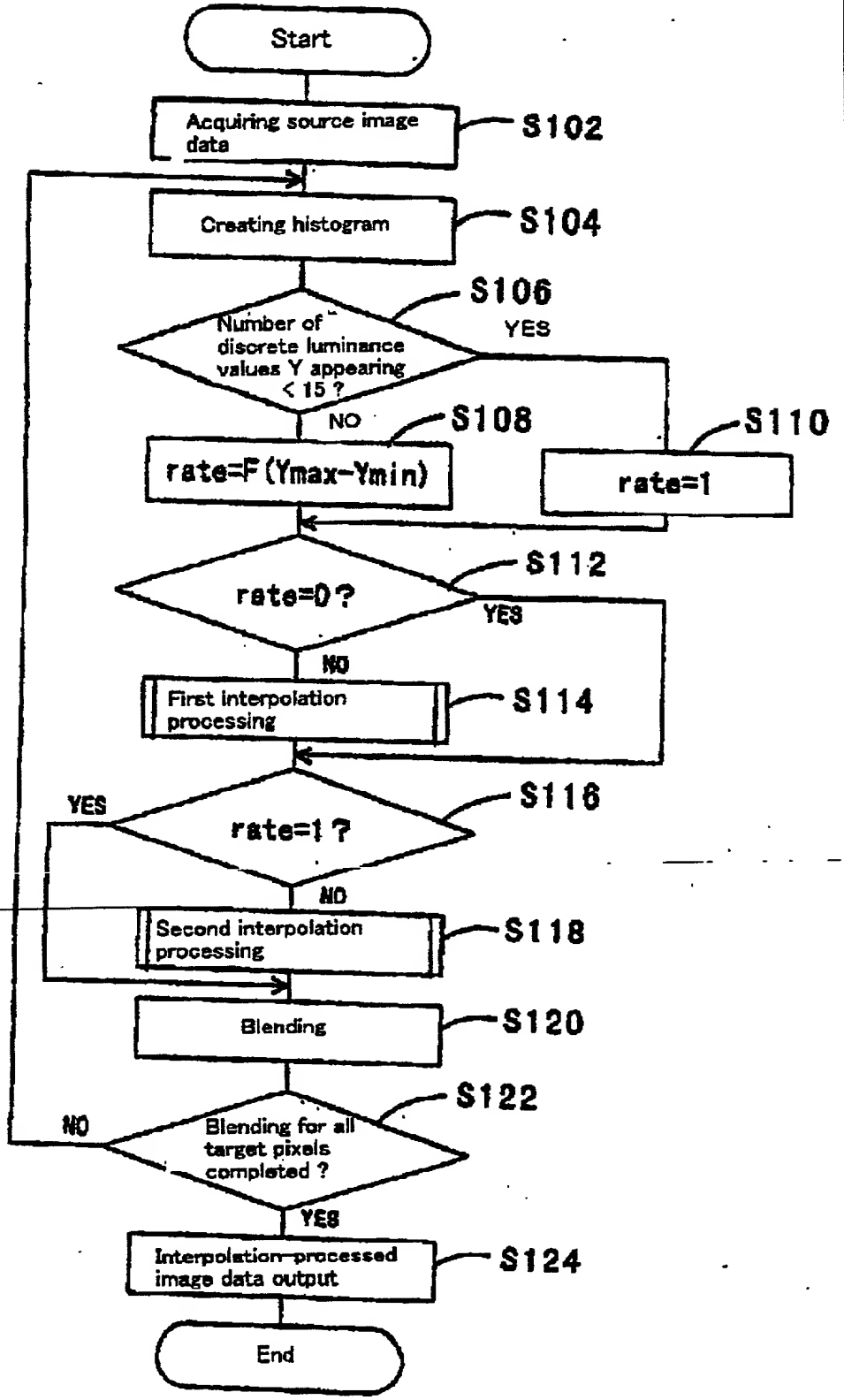

Start
Acquiring source image data
S102
Creating histogram
S104
Number of discrete luminance values Y appearing < 15 ?
S106
YES
NO
S108
rate=F(Ymax-Ymin)
S110
rate=1
rate=0 ?
S112
YES
NO
First interpolation processing
S114
YES
rate=1 ?
S116
NO
Second interpolation processing
S118
Blending
S120
NO
Blending for all target pixels completed ?
S122
YES
Interpolation-processed image data output
S124
End

FIG.8

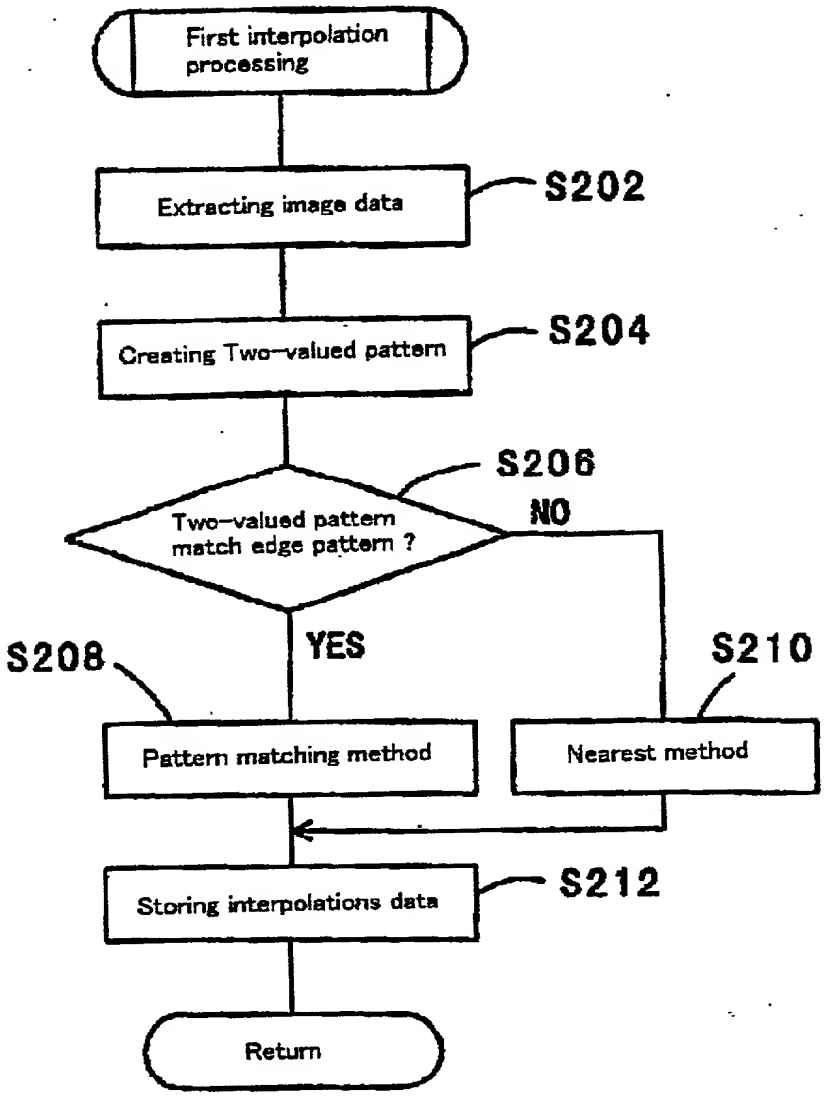

First interpolation processing
Extracting image data
S202
Creating Two-valued pattern
S204
S206
Two-valued pattern match edge pattern ?
NO
YES
S208
S210
Pattern matching method
Nearest method
Storing interpolations data
S212
Return

FIG.9

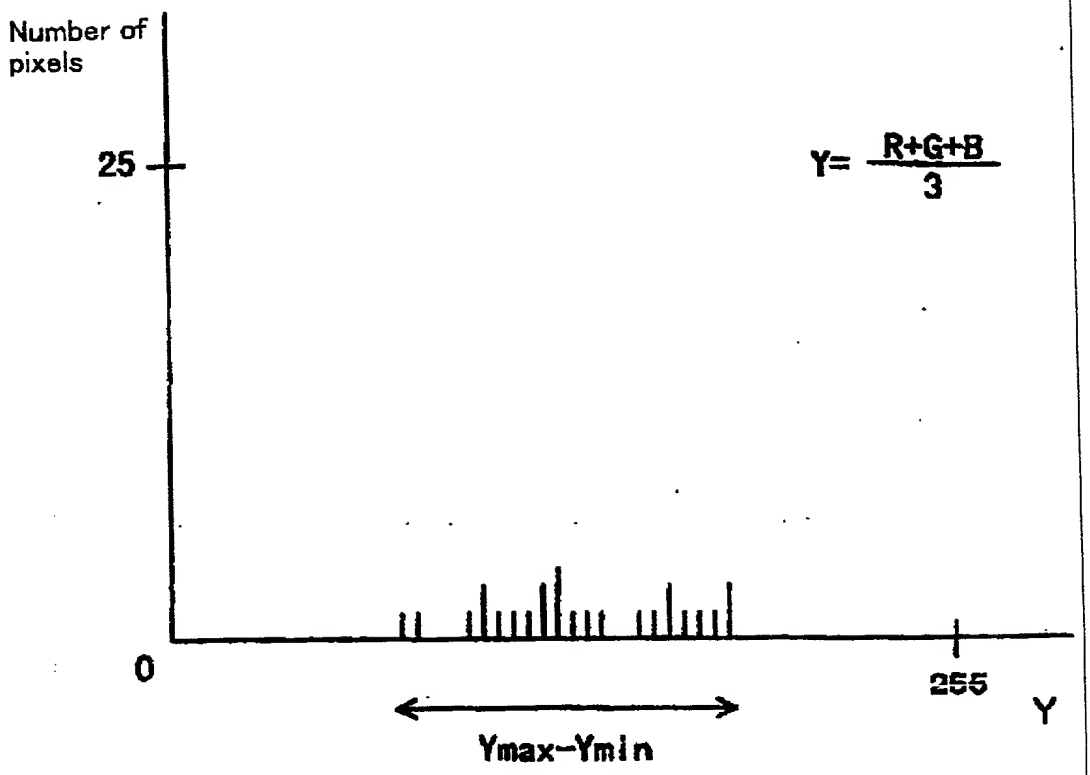


FIG.10

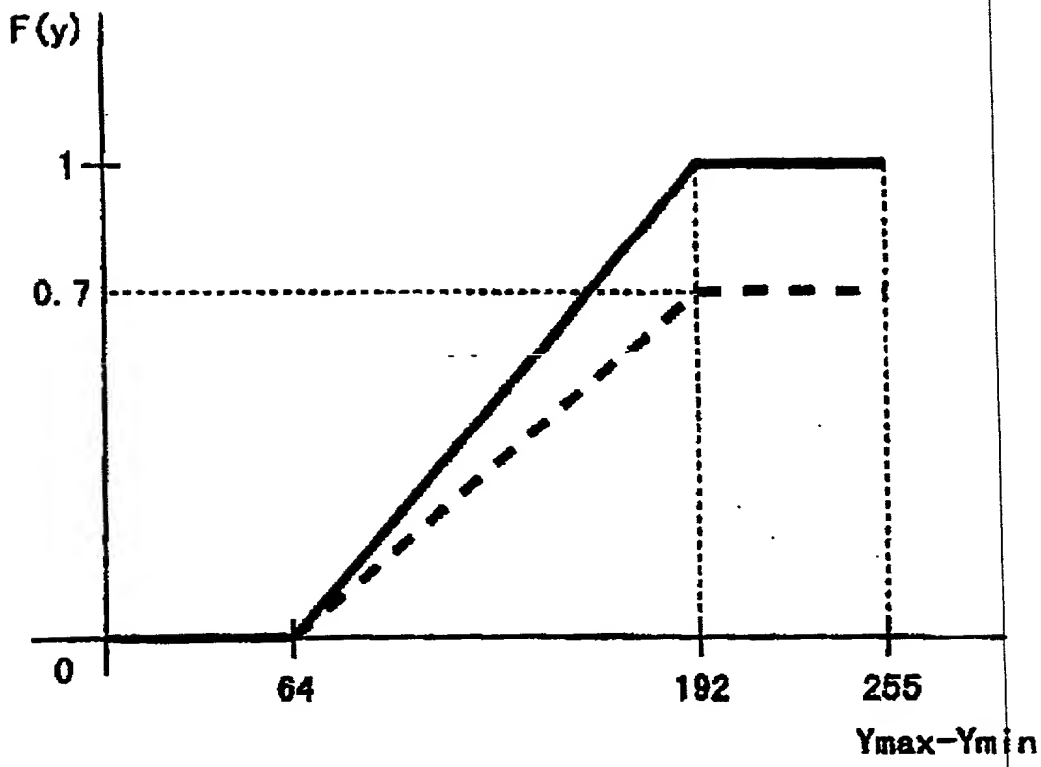


FIG. 11

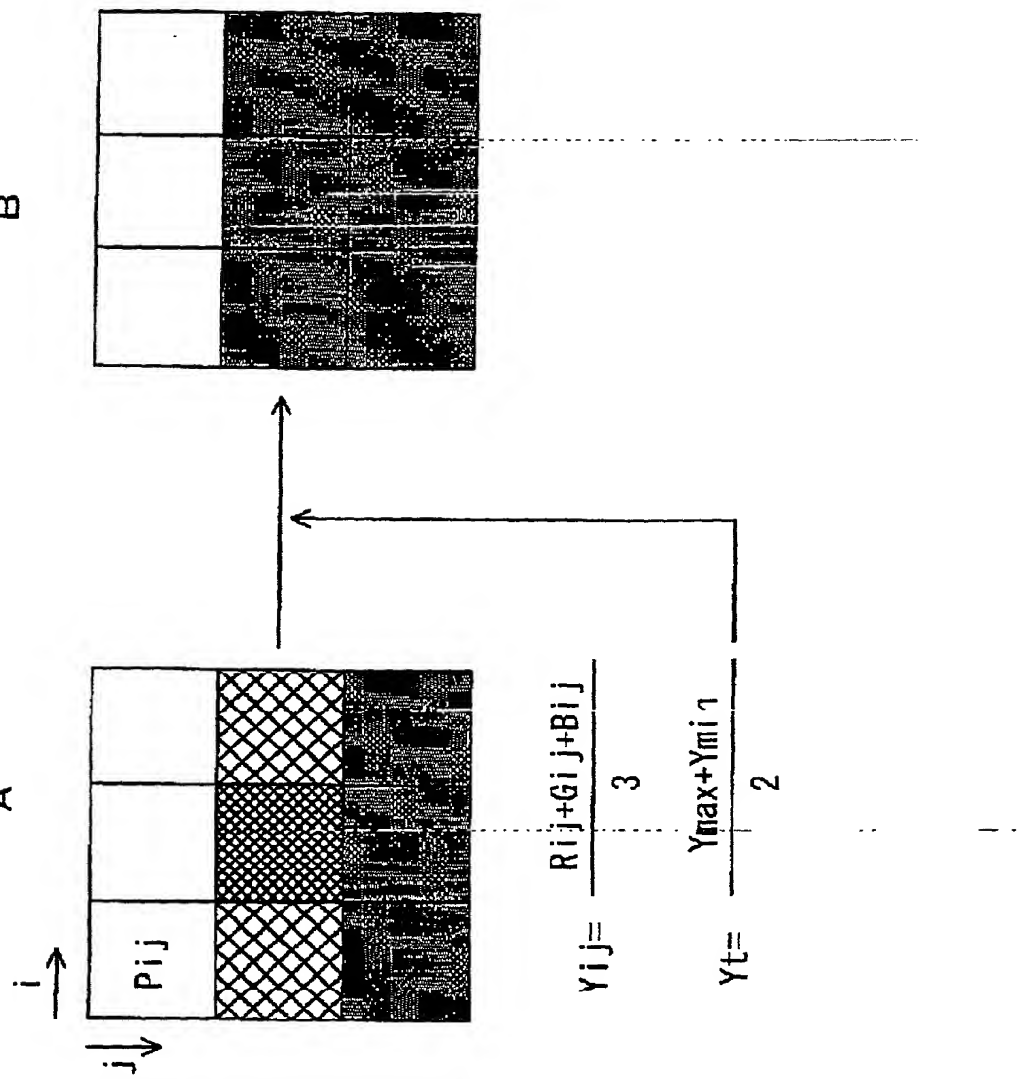


FIG.12

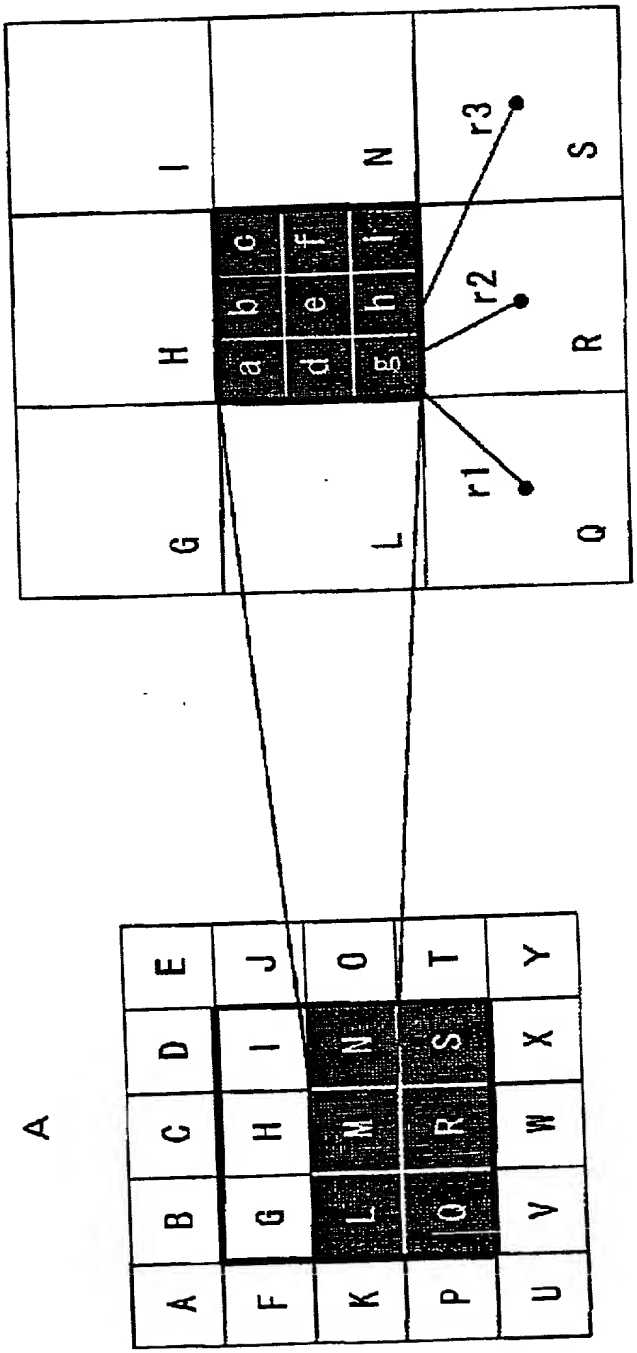

B
I
N
S
H
a
b
c
d
e
f
g
h
i
R
G
L
Q
r1
r2
r3
A
E
J
O
T
Y
D
I
N
S
X
C
H
M
R
W
B
G
L
Q
V
A
F
K
P
U

FIG. 13

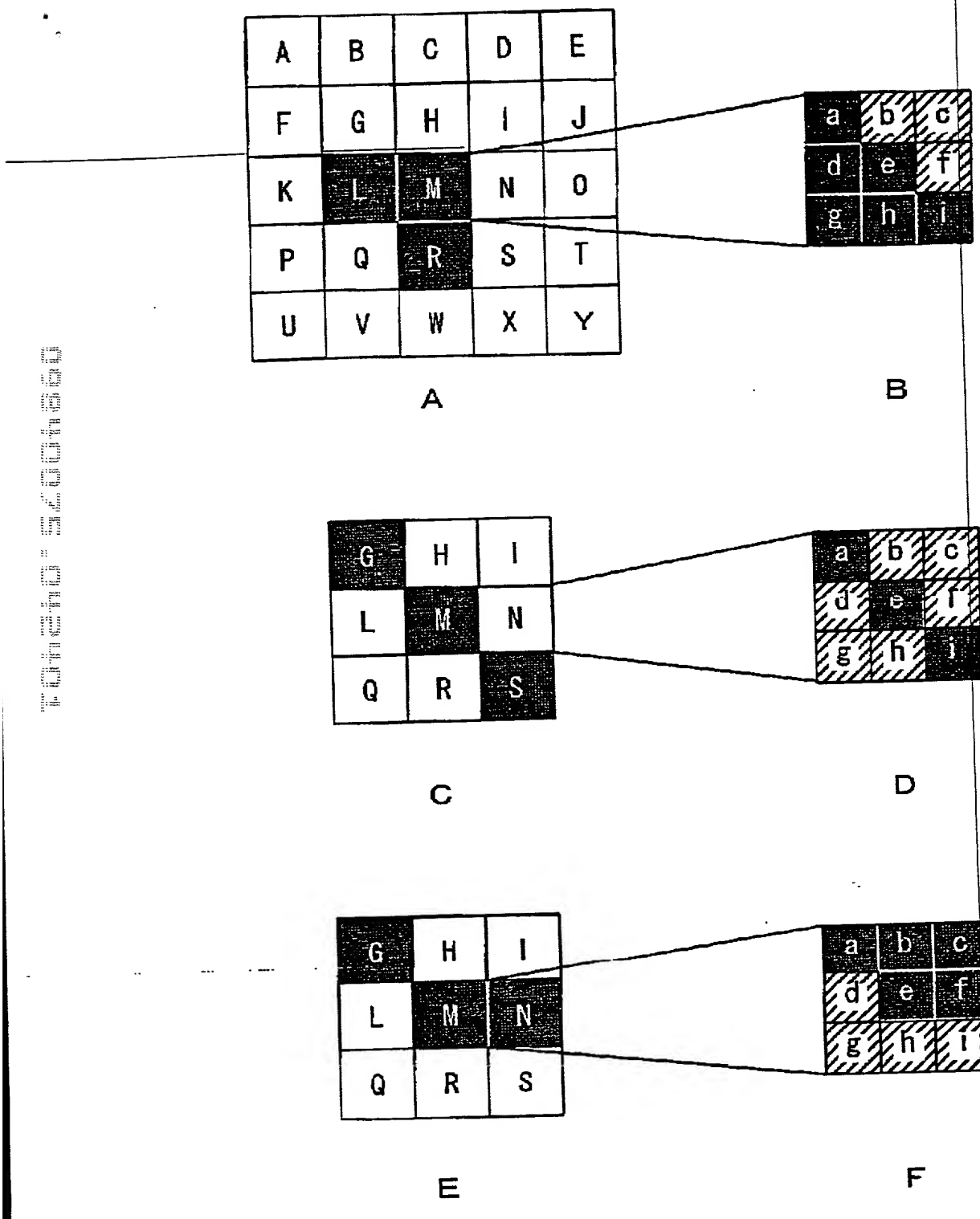

A B C D E
F G H I J
K L M N O
P Q R S T
U V W X Y
a b c
d e f
g h i
A
B
G H I
L M N
Q R S
a b c
d e f
g h i
C
D
G H I
L M N
Q R S
a b c
d e f
g h i
E
F

FIG.14

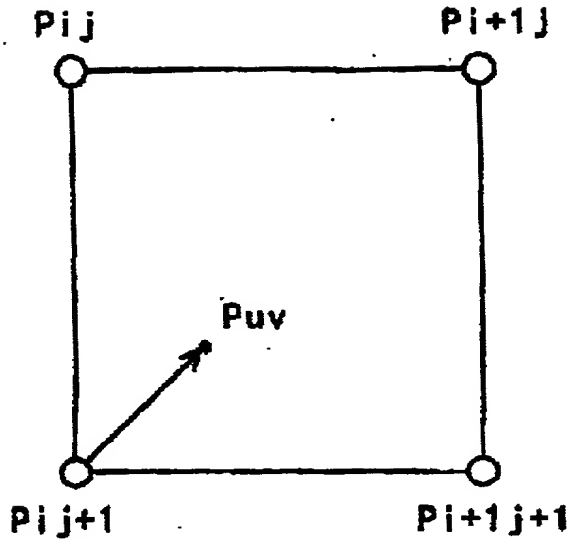


FIG.15

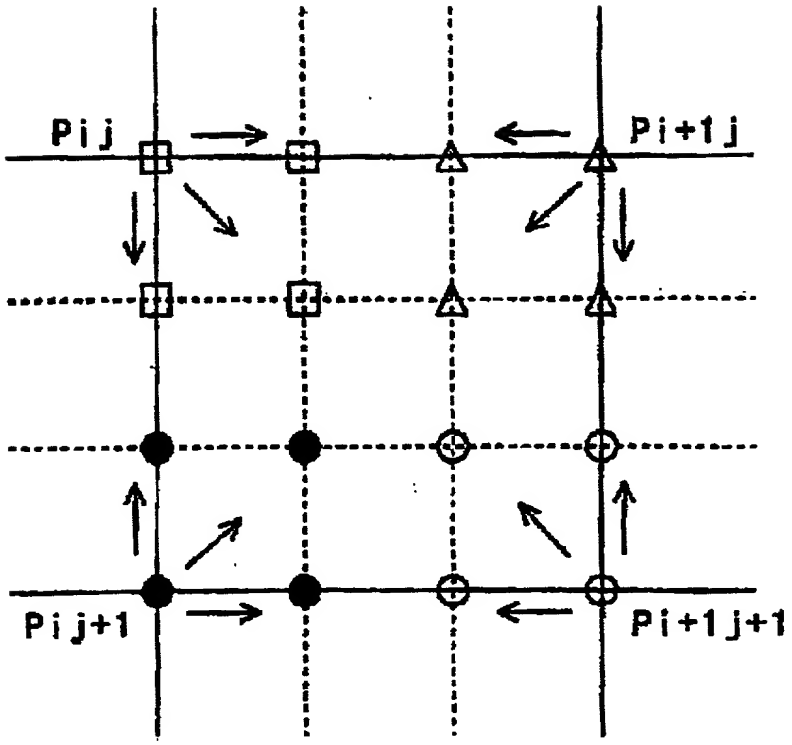
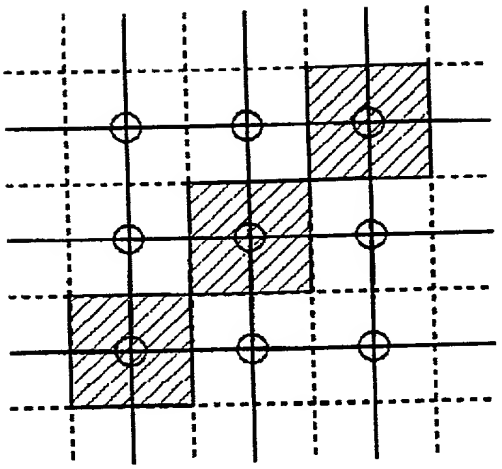


FIG. 16



○ Existing pixel

FIG. 17

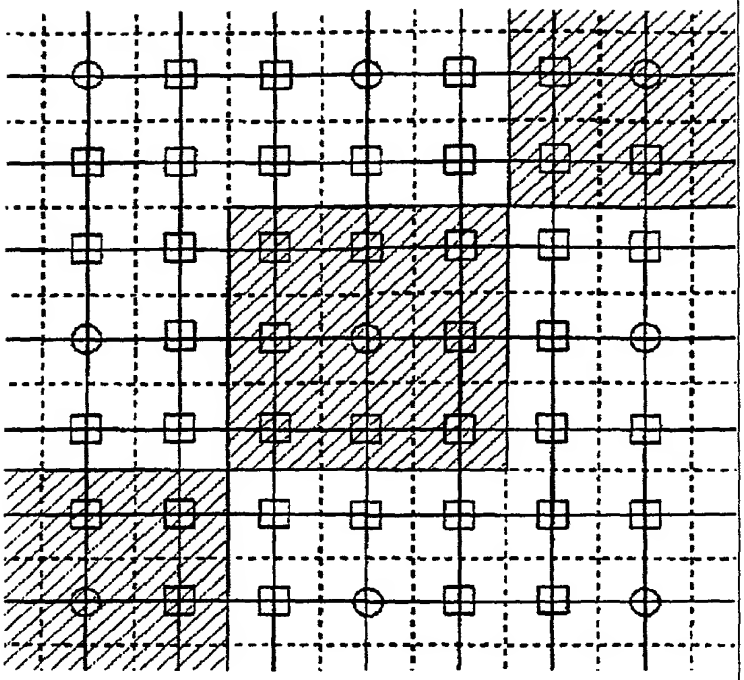


FIG.18

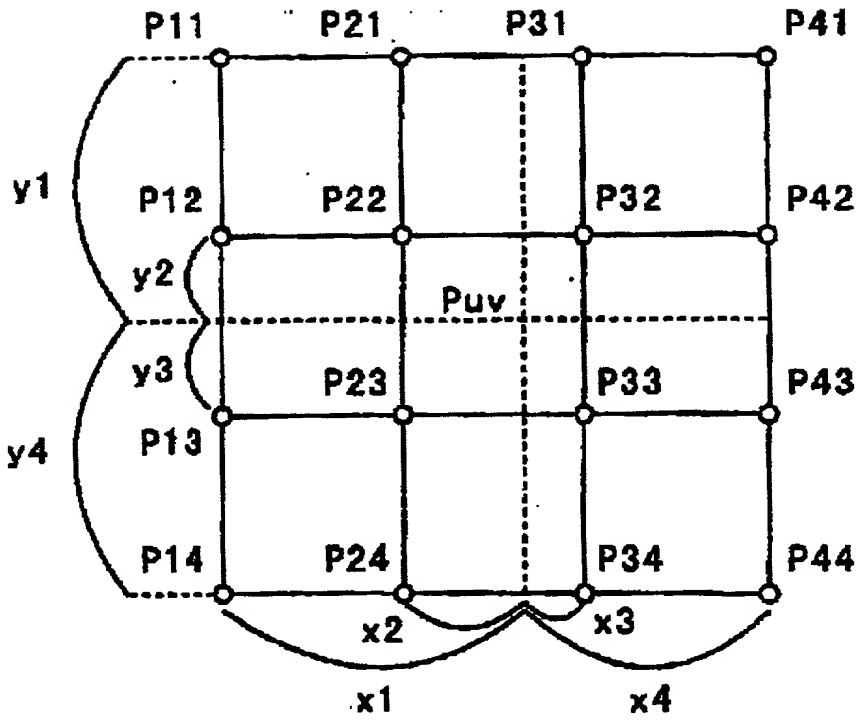

P11
P21
P31
P41
y1
P12
P22
P32
P42
y2
Puv
y3
P23
P33
P43
y4
P13
P14
P24
P34
P44
x2
x3
x1
x4

FIG. 19

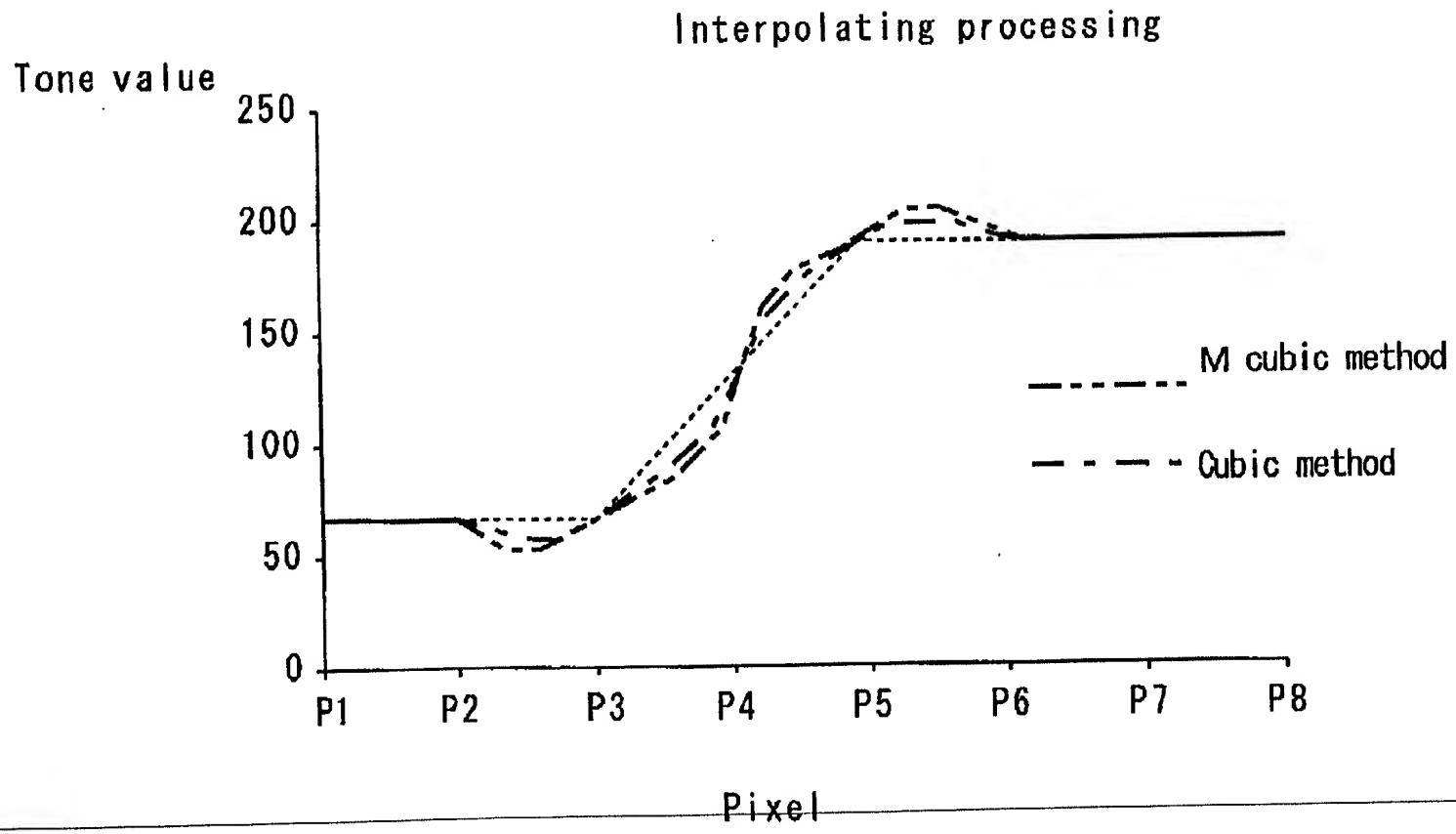


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FIG. 20

	Pixel	Original	x1	x2	x3	x4	f1	f2	f3	f4	Cubic
64	P0	64									
64											
64											
64											
64	P1	64	1	0	1	2	0	1	0	0	64
64	P11		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	64
64	P12		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	64
64	P13		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	64
64	P2	64	1	0	1	2	0	1	0	0	64
64	P21		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	61
64	P22		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	56
64	P23		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	55
64	P3	64	1	0	1	2	0	1	0	0	64
80	P31		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	77
96	P32		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	88
112	P33		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	103
128	P4	128	1	0	1	2	0	1	0	0	128
144	P41		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	153
160	P42		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	168
176	P43		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	179
192	P5	192	1	0	1	2	0	1	0	0	192
192	P51		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	201
192	P52		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	200
192	P53		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	195
192	P6	192	1	0	1	2	0	1	0	0	192
192	P61		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	192
192	P62		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	192
192	P63		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	192
192	P7	192	1	0	1	2	0	1	0	0	192
192	P71		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	192
192	P72		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	192
192	P73		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	192
192	P8	192	1	0	1	2	0	1	0	0	192
192	P81		1.25	0.25	0.75	1.75	-0.14063	0.890625	0.296875	-0.04688	
192	P82		1.5	0.5	0.5	1.5	-0.125	0.625	0.625	-0.125	
192	P83		1.75	0.75	0.25	1.25	-0.04688	0.296875	0.890625	-0.14063	
192	P9	192	1	0	1	2	0	1	0	0	

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FIG. 21

	Pixel	Original	x1	x2	x3	x4	f1	f2	f3	f4	Moublo
64	P0	64									
64											
64											
64											
64	P1	64	1	0	1	2	0.00	1.00	0.00	0.00	64
64	P11		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	64
64	P12		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	64
64	P13		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	64
64	P2	64	1	0	1	2	0.00	1.00	0.00	0.00	64
64	P21		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	51
64	P22		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	50
64	P23		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	5
64	P3	64	1	0	1	2	0.00	1.00	0.00	0.00	64
80	P31		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	7
96	P32		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	8
112	P33		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	9
128	P4	128	1	0	1	2	0.00	1.00	0.00	0.00	128
144	P41		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	157
160	P42		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	174
176	P43		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	183
192	P5	192	1	0	1	2	0.00	1.00	0.00	0.00	192
192	P51		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	205
192	P52		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	206
192	P53		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	199
192	P6	192	1	0	1	2	0.00	1.00	0.00	0.00	192
192	P61		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	192
192	P62		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	192
192	P63		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	192
192	P7	192	1	0	1	2	0.00	1.00	0.00	0.00	192
192	P71		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	192
192	P72		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	192
192	P73		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	192
192	P8	192	1	0	1	2	0.00	1.00	0.00	0.00	192
192	P81		1.25	0.25	0.75	1.75	-0.20	0.95	0.36	-0.11	
192	P82		1.5	0.5	0.5	1.5	-0.21	0.71	0.71	-0.21	
192	P83		1.75	0.75	0.25	1.25	-0.11	0.36	0.95	-0.20	
192	P9	192	1	0	1	2	0.00	1.00	0.00	0.00	

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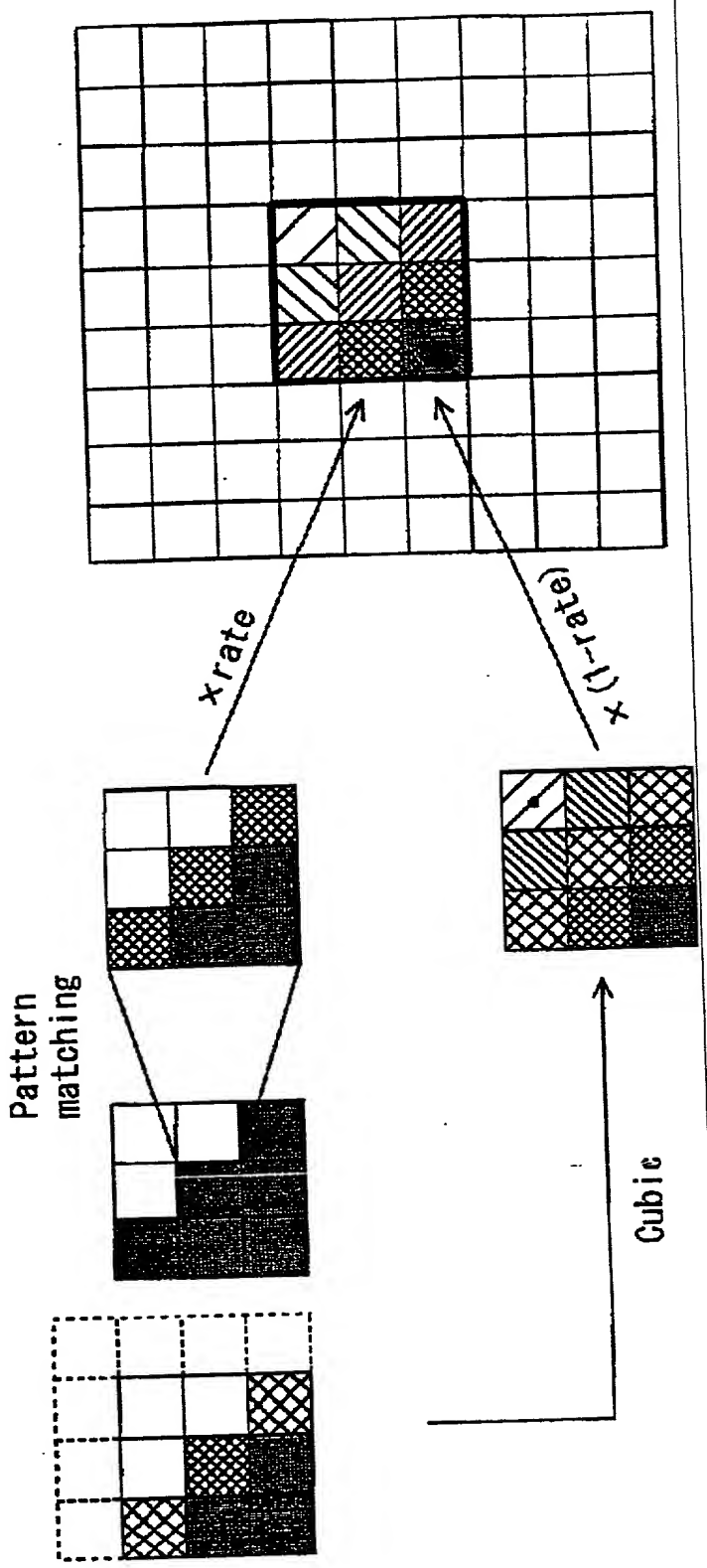


FIG. 22

FIG.23

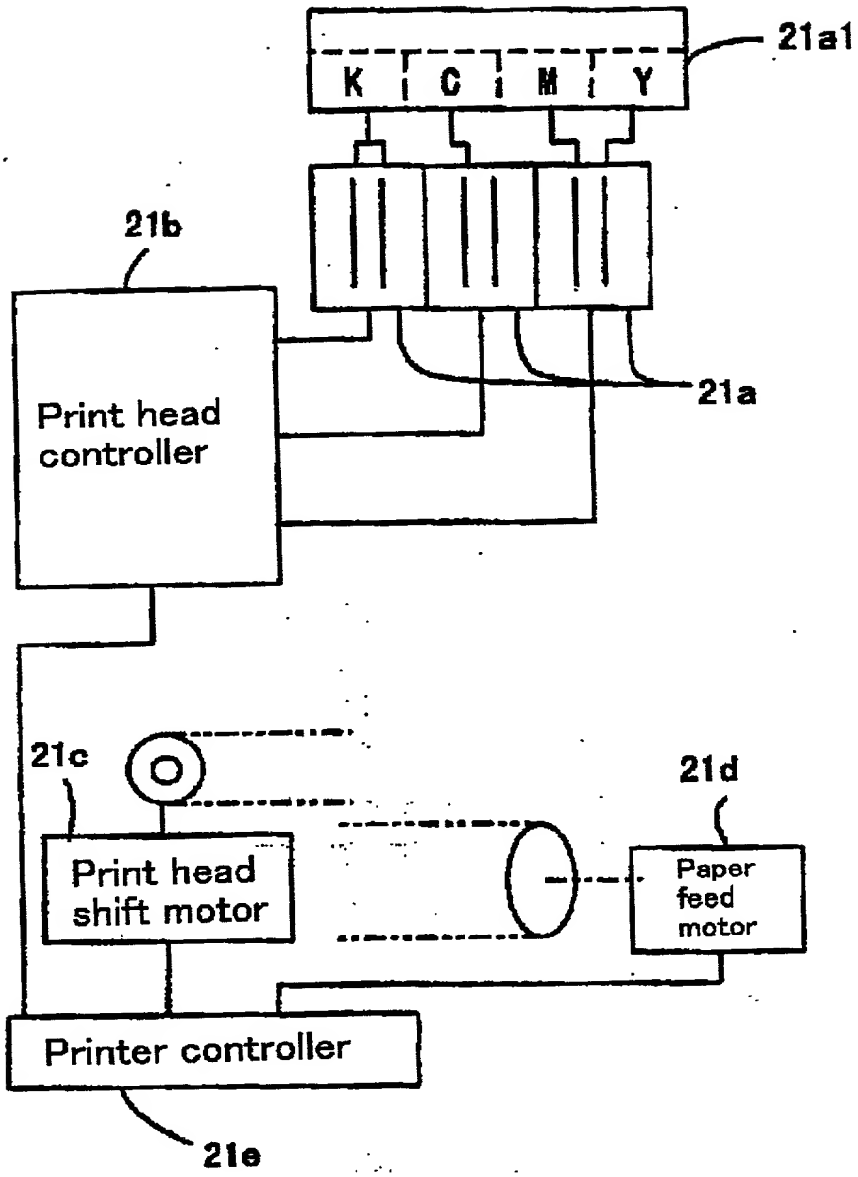

21a1
K
C
M
Y
21b
Print head controller
21a
21c
21d
Print head shift motor
Paper feed motor
Printer controller
21e

FIG.24

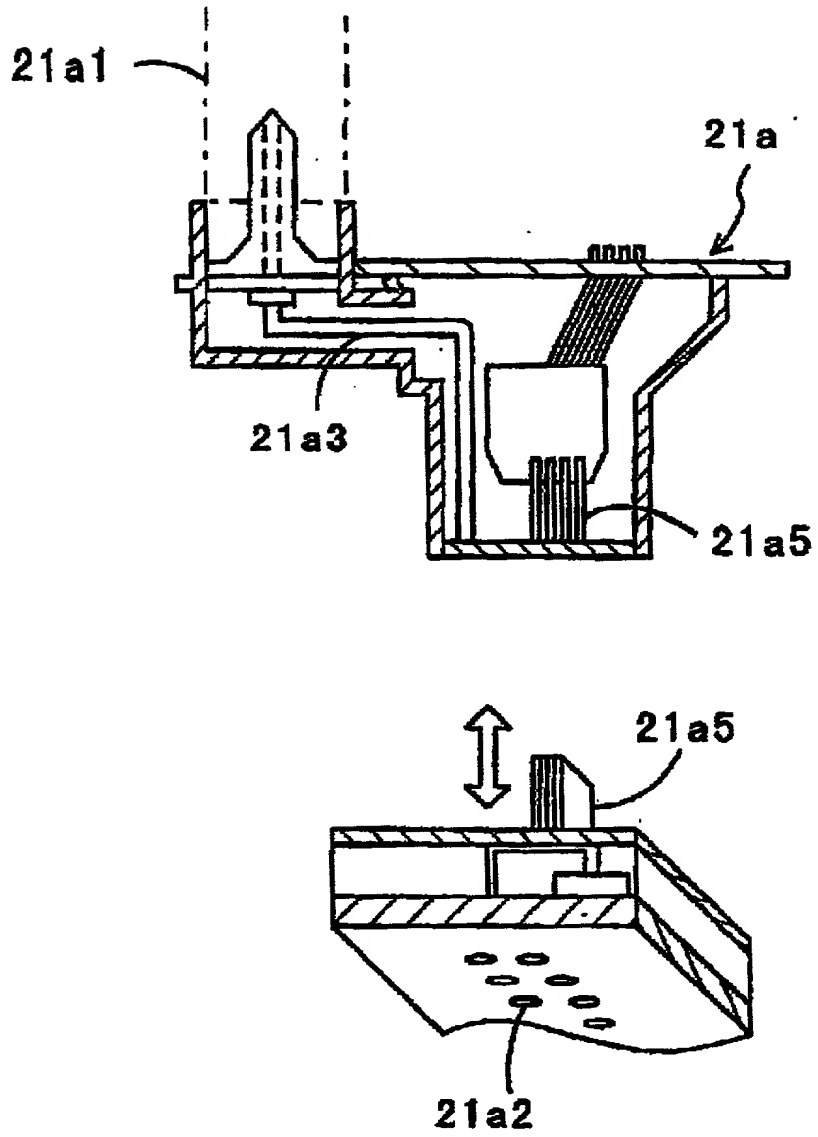


FIG.25

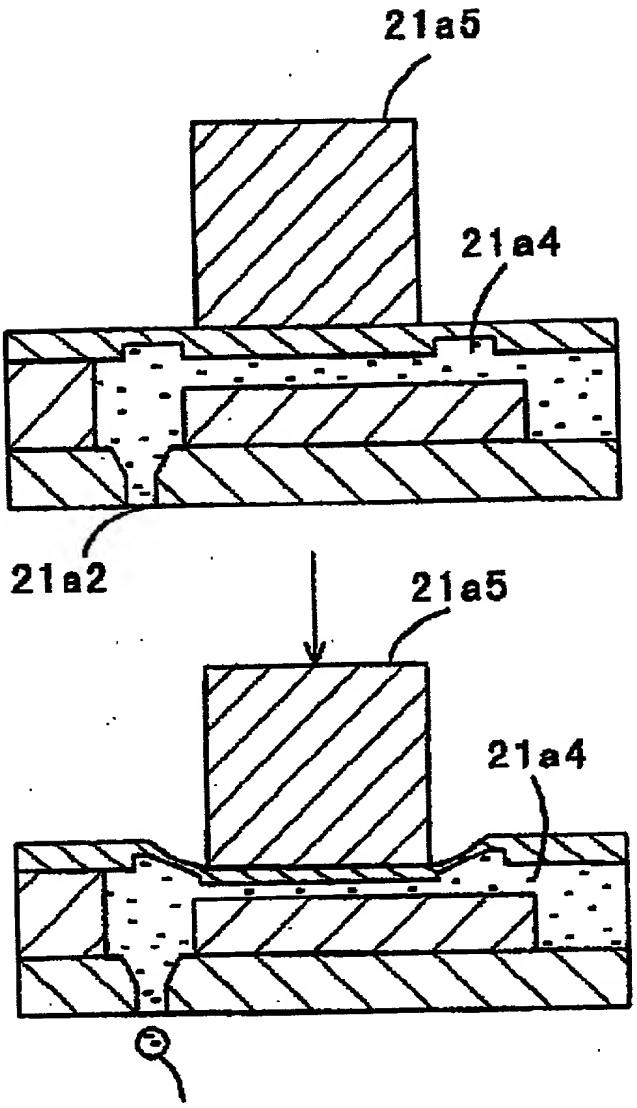


FIG.26

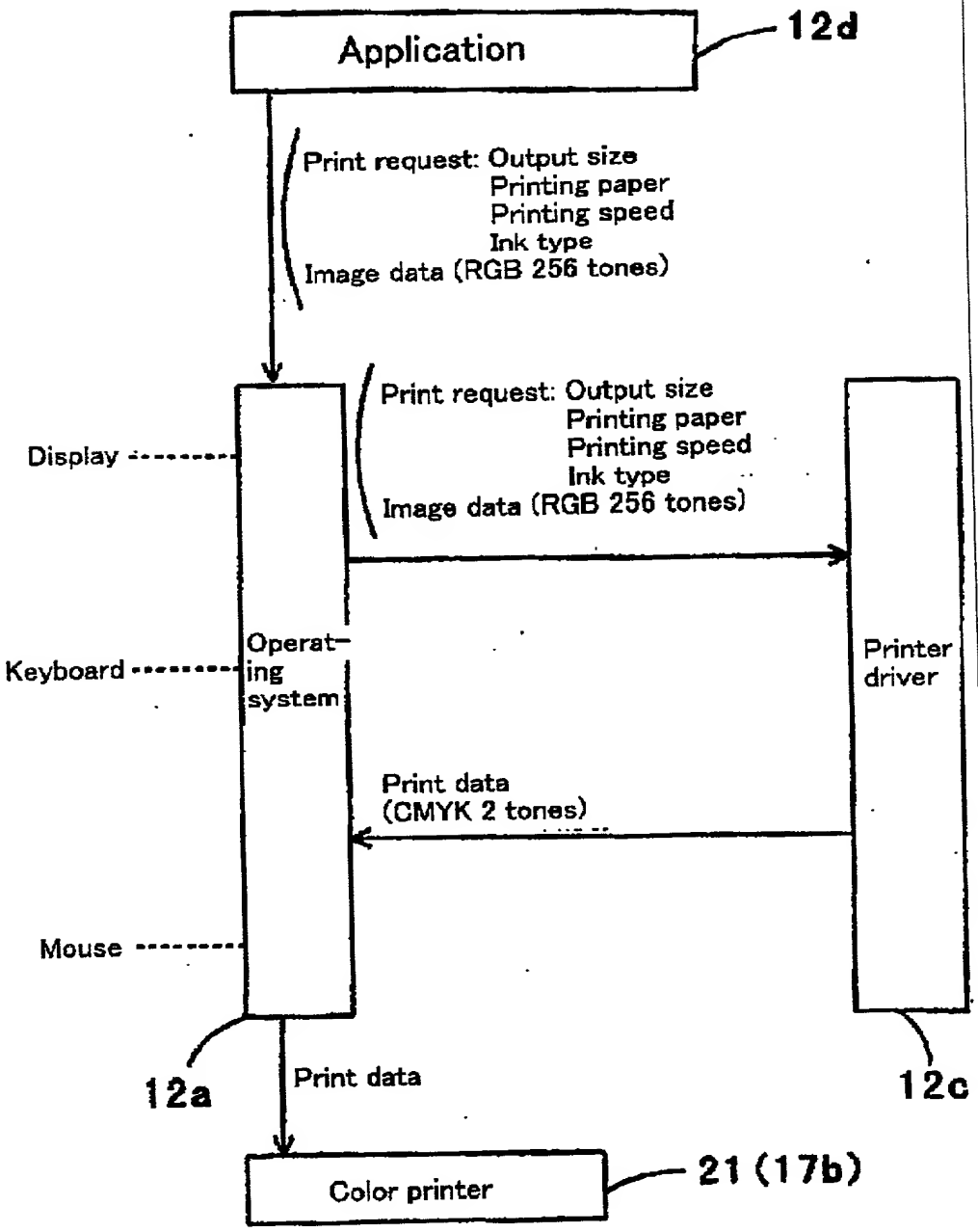

Application
12d
Print request: Output size
Printing paper
Printing speed
Ink type
Image data (RGB 256 tones)
Print request: Output size
Printing paper
Printing speed
Ink type
Image data (RGB 256 tones)
Display
Keyboard
Operat-
ing
system
Printer
driver
Print data
(CMYK 2 tones)
Mouse
12a
Print data
12c
Color printer
21 (17b)

FIG.27A

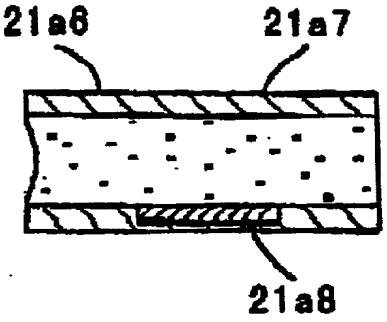


FIG.27B

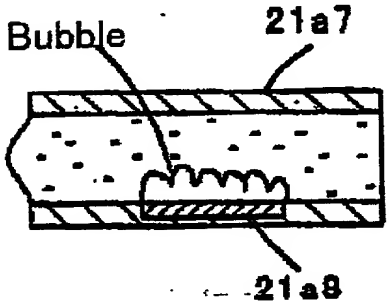


FIG.27C

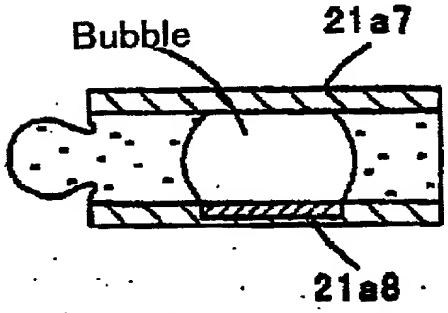


FIG.27D

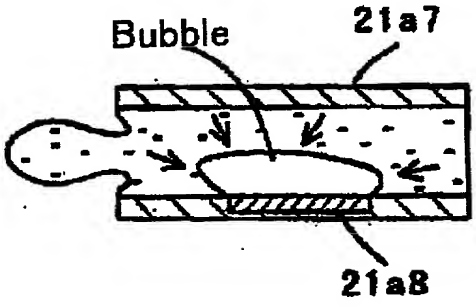


FIG.27E

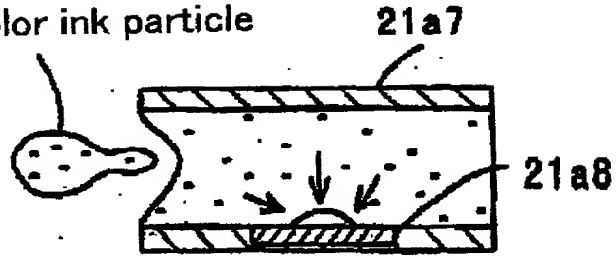


FIG.28

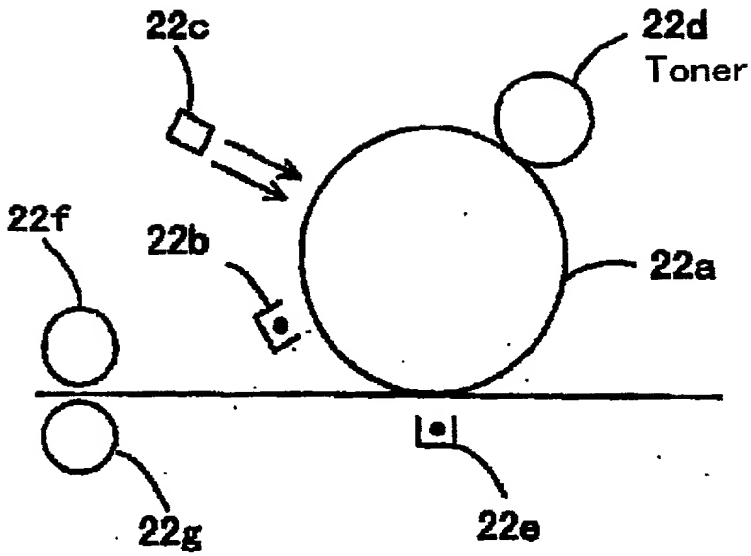


FIG.29

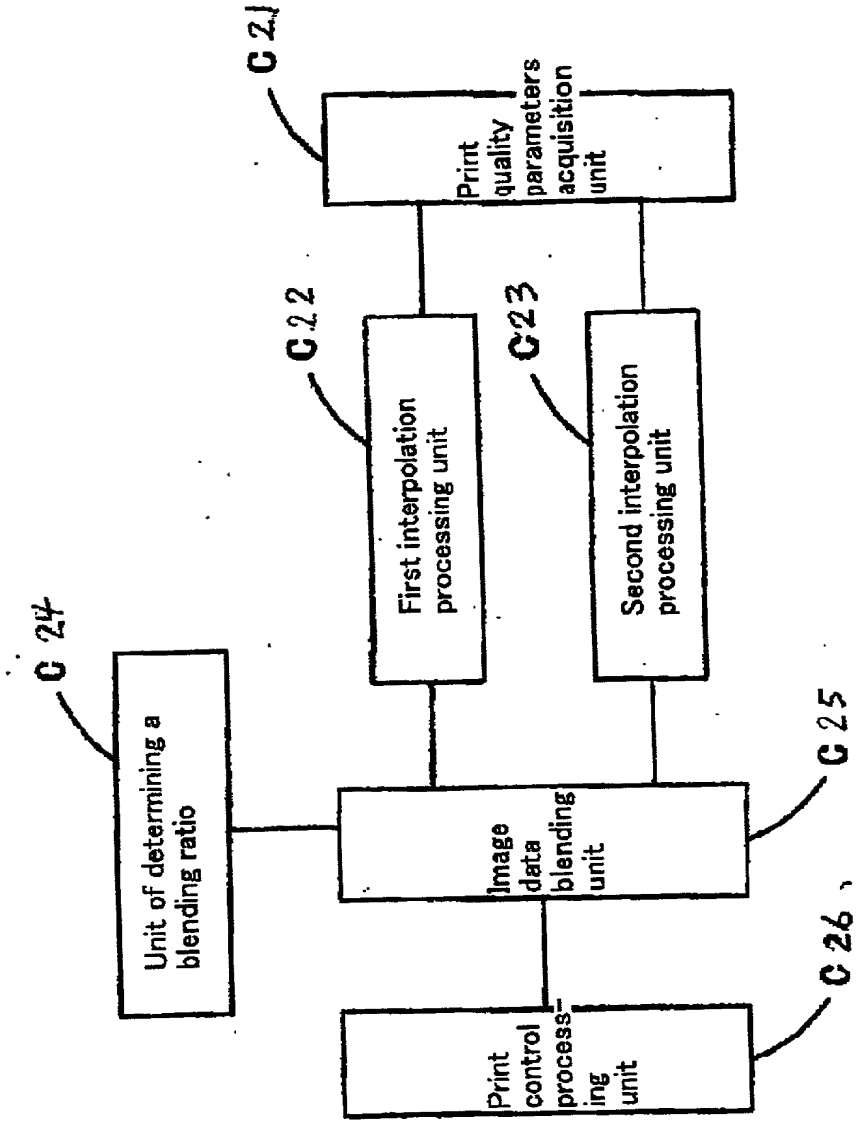

C21
Print quality parameters acquisition unit
C22
First interpolation processing unit
C23
Second interpolation processing unit
C24
Unit of determining a blending ratio
C25
Image data blending unit
C26
Print control processing unit

FIG.30

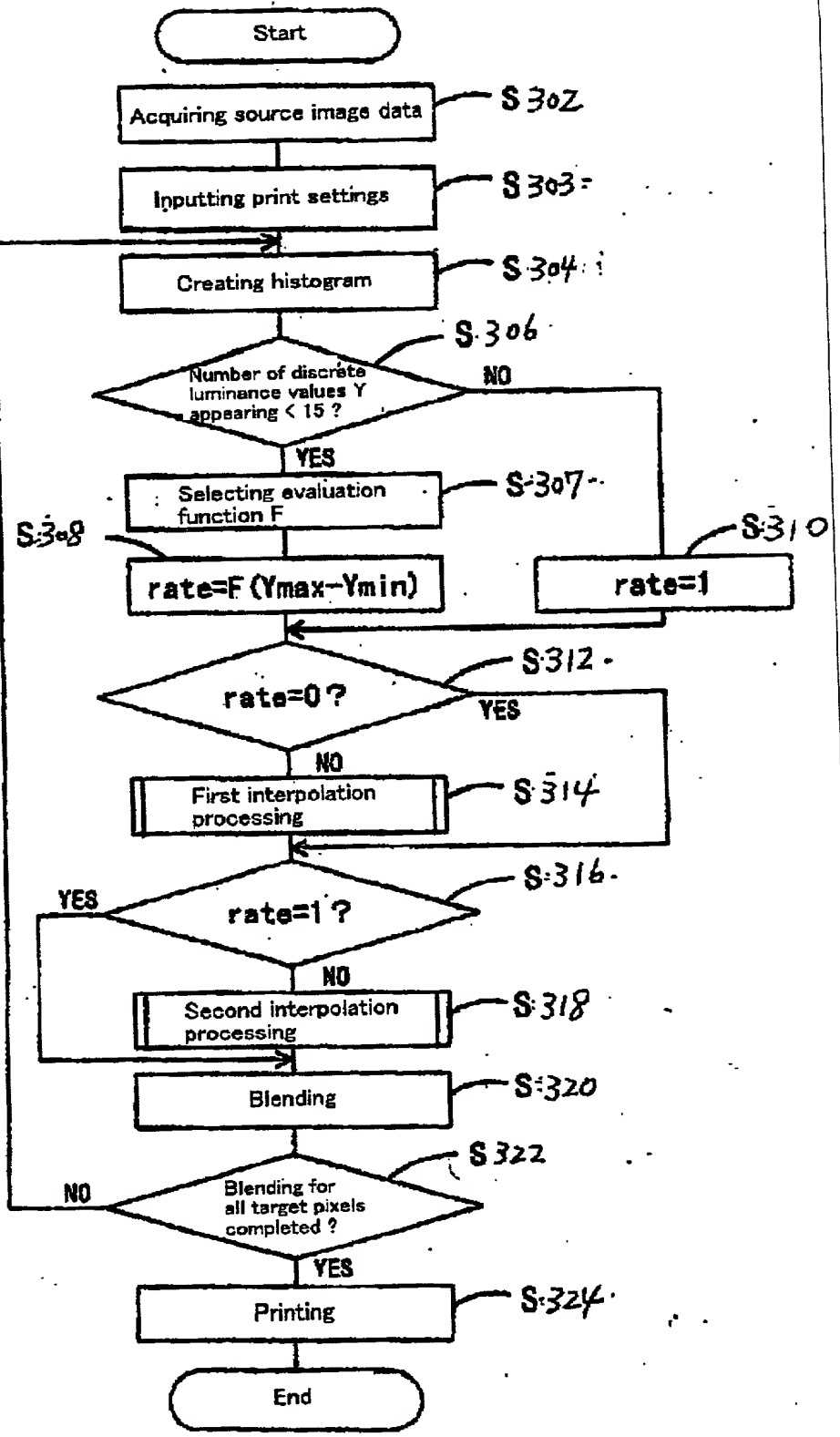

Start
Acquiring source image data
S302
Inputting print settings
S303
Creating histogram
S304
Number of discrete luminance values Y appearing < 15 ?
S306
NO
YES
Selecting evaluation function F
S307
S308
S310
rate=F(Ymax-Ymin)
rate=1
rate=0?
S312
YES
NO
First interpolation processing
S314
YES
rate=1?
S316
NO
Second interpolation processing
S318
Blending
S320
Blending for all target pixels completed ?
S322
NO
YES
Printing
S324
End

FIG.31

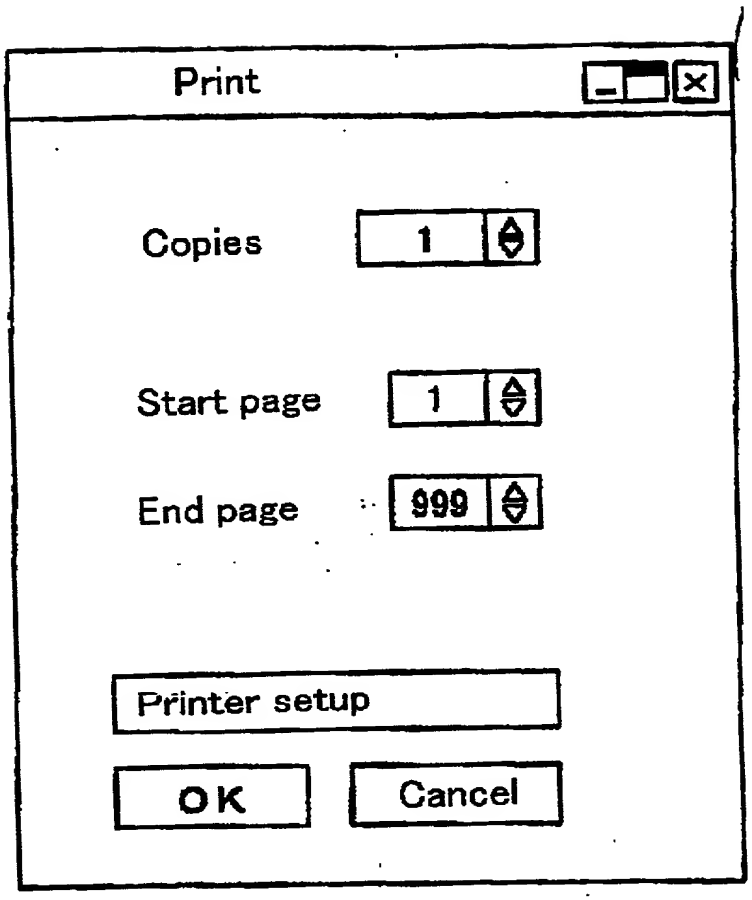

Print
Copies
1
Start page
1
End page
999
Printer setup
OK
Cancel

FIG.32

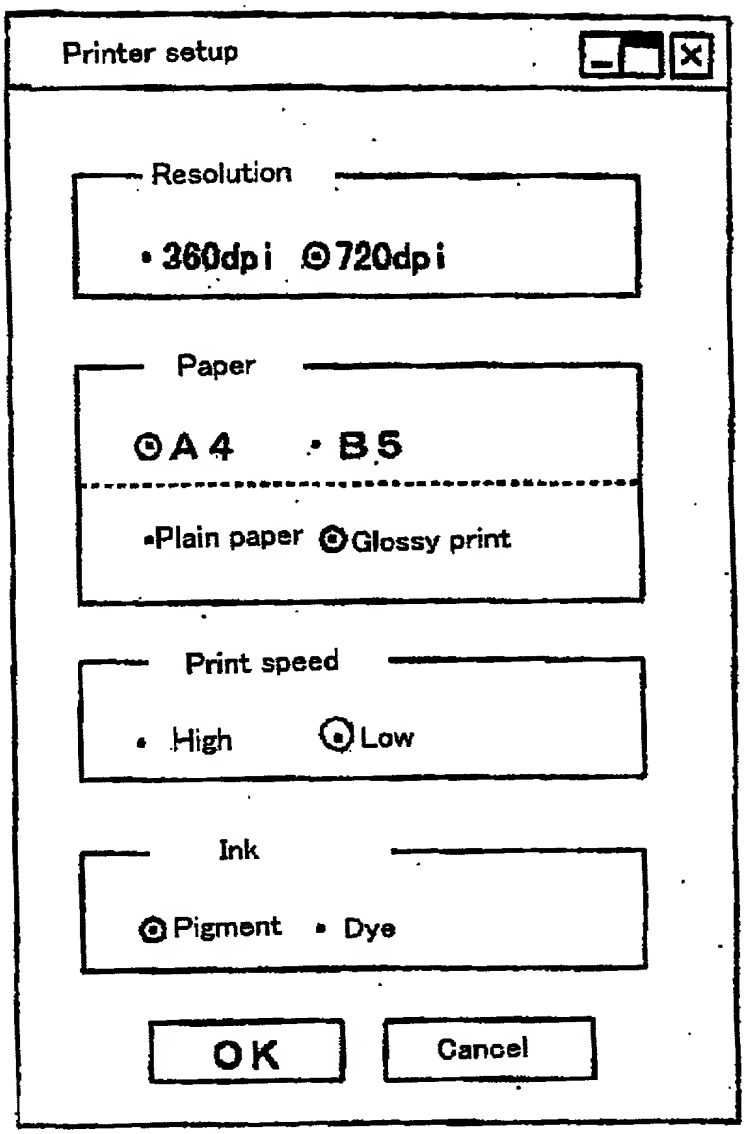

Printer setup
Resolution
360dpi
720dpi
Paper
A4
B5
Plain paper
Glossy print
Print speed
High
Low
Ink
Pigment
Dye
OK
Cancel

FIG.33

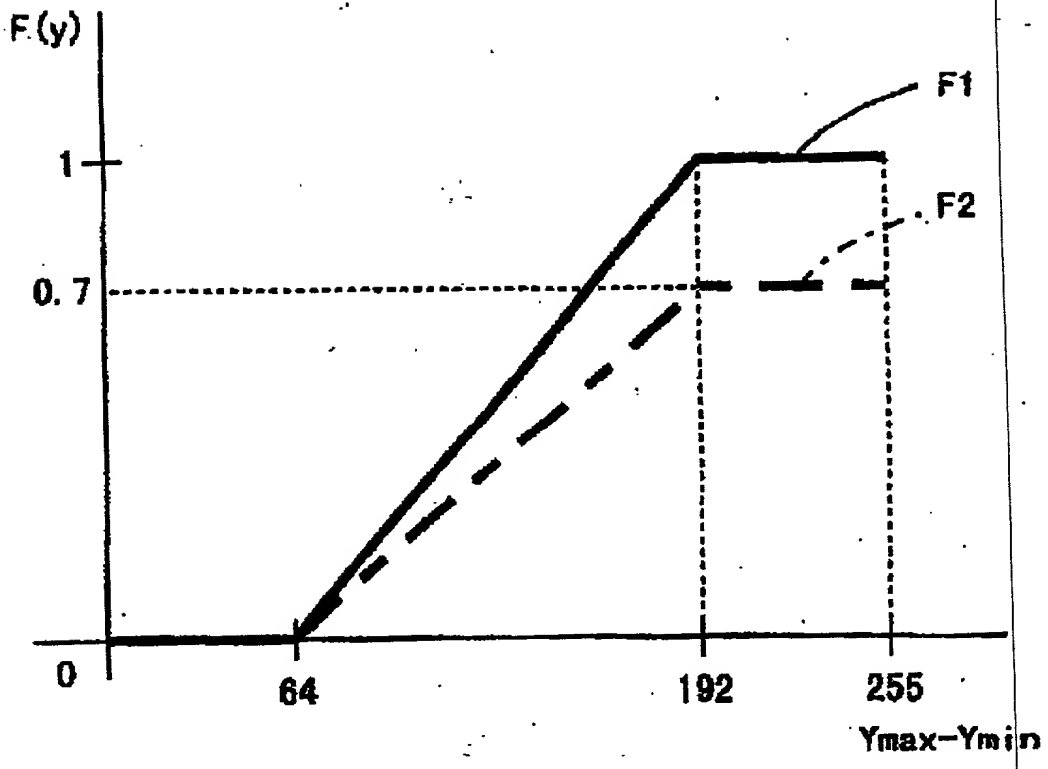


FIG.34

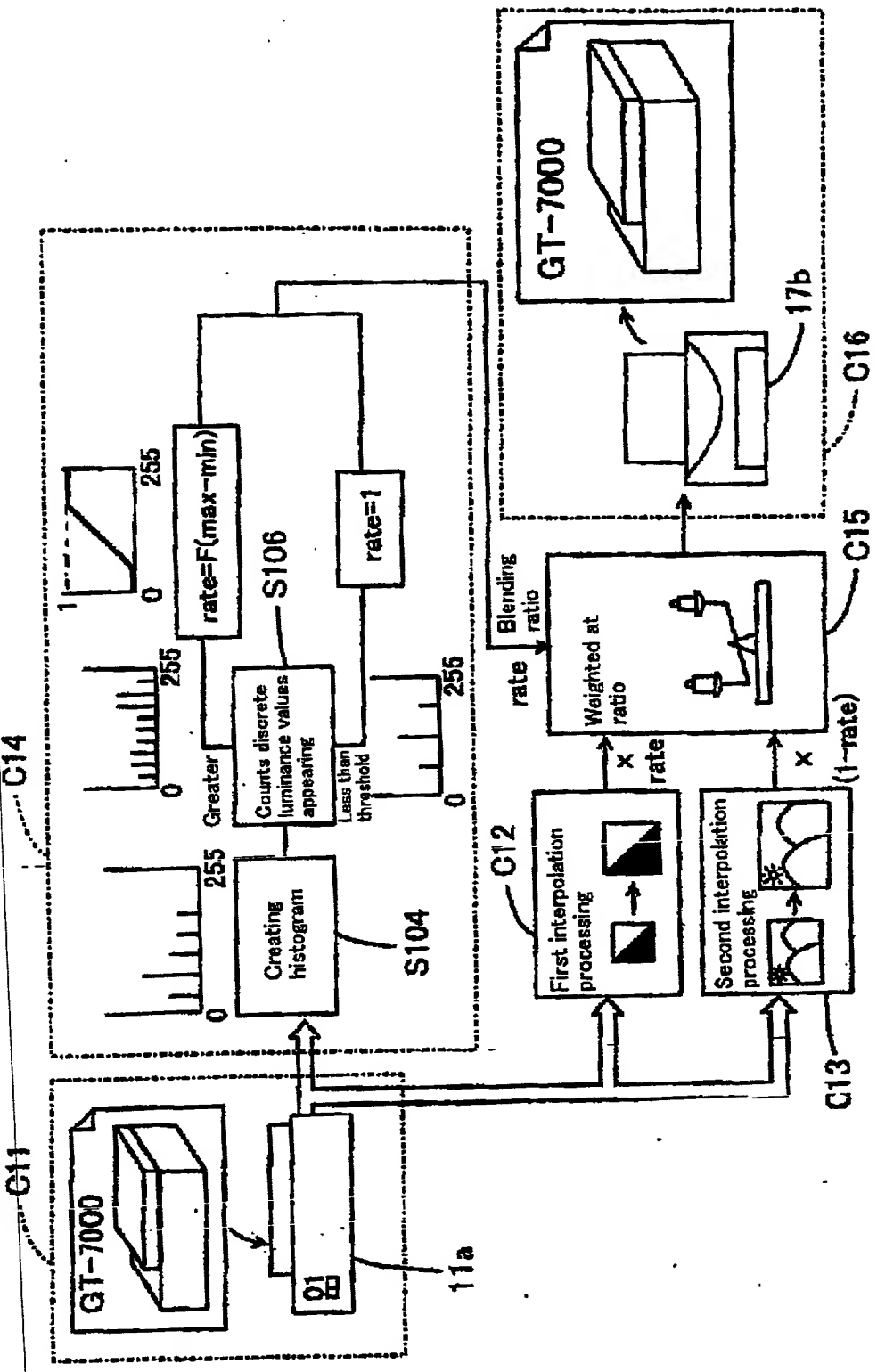
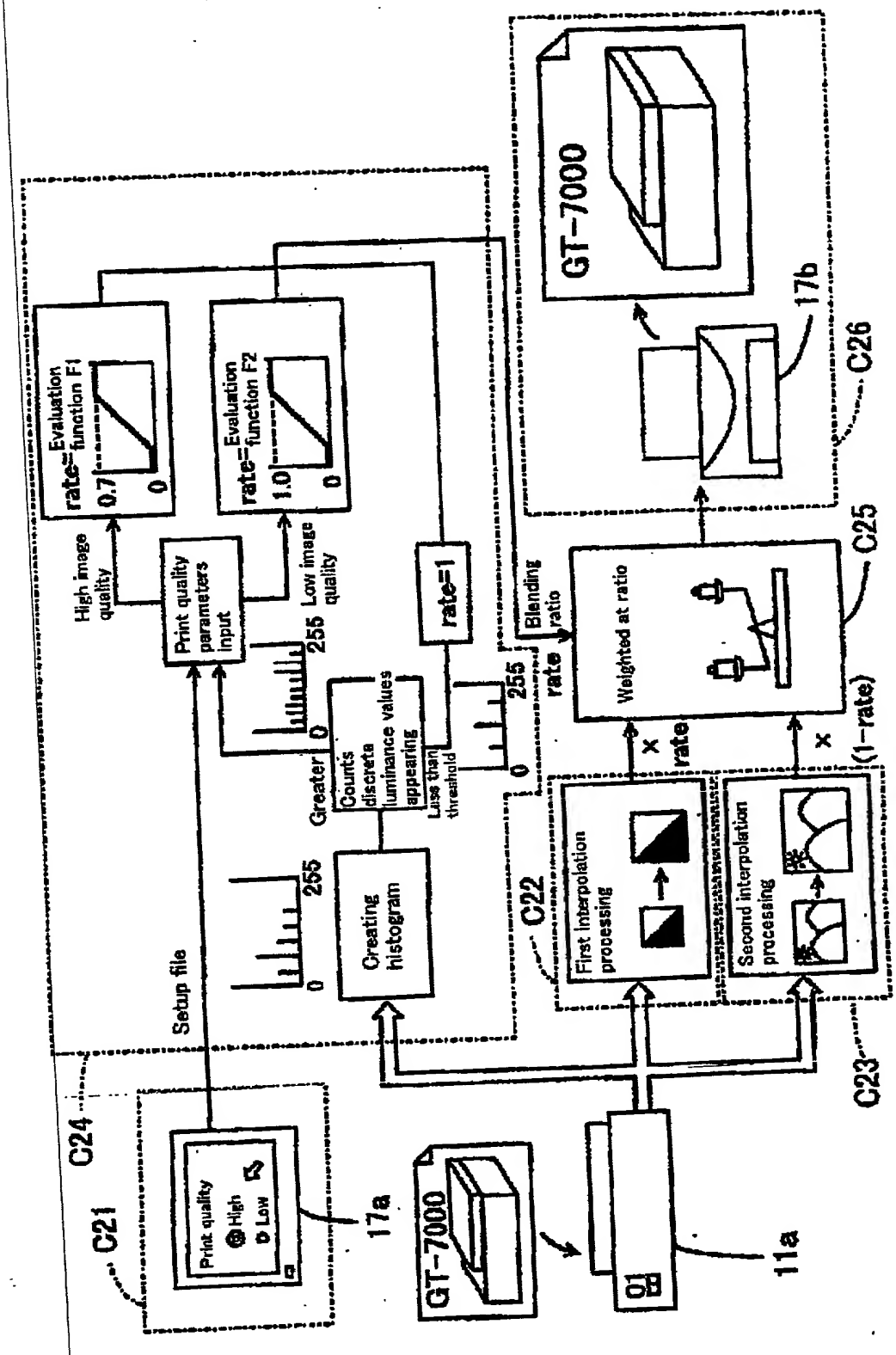

C11
GT-7000
01
11a
C14
Creating histogram
S104
255
0
Courts discrete luminance values appearing
Greater
Less than threshold
S106
rate=F(max-min)
rate=1
C12
First interpolation processing
C13
Second interpolation processing
rate
(1-rate)
Blending ratio
Weighted at ratio
C15
C16
17b
GT-7000

FIG.35


C21
C24
Print quality
High
Low
17a
GT-7000
11a
Setup file
Creating histogram
0
255
Greater
Counts discrete luminance values appearing
Less than threshold
C22
First interpolation processing
Second interpolation processing
C23
rate=1
Print quality parameters input
High image quality
Low image quality
Evaluation function F1
Evaluation function F2
rate=
0.7
1.0
Blending ratio
Weighted at ratio
rate
(1-rate)
C25
C26
17b
GT-7000

T0h2h0 S200h860

Fig36

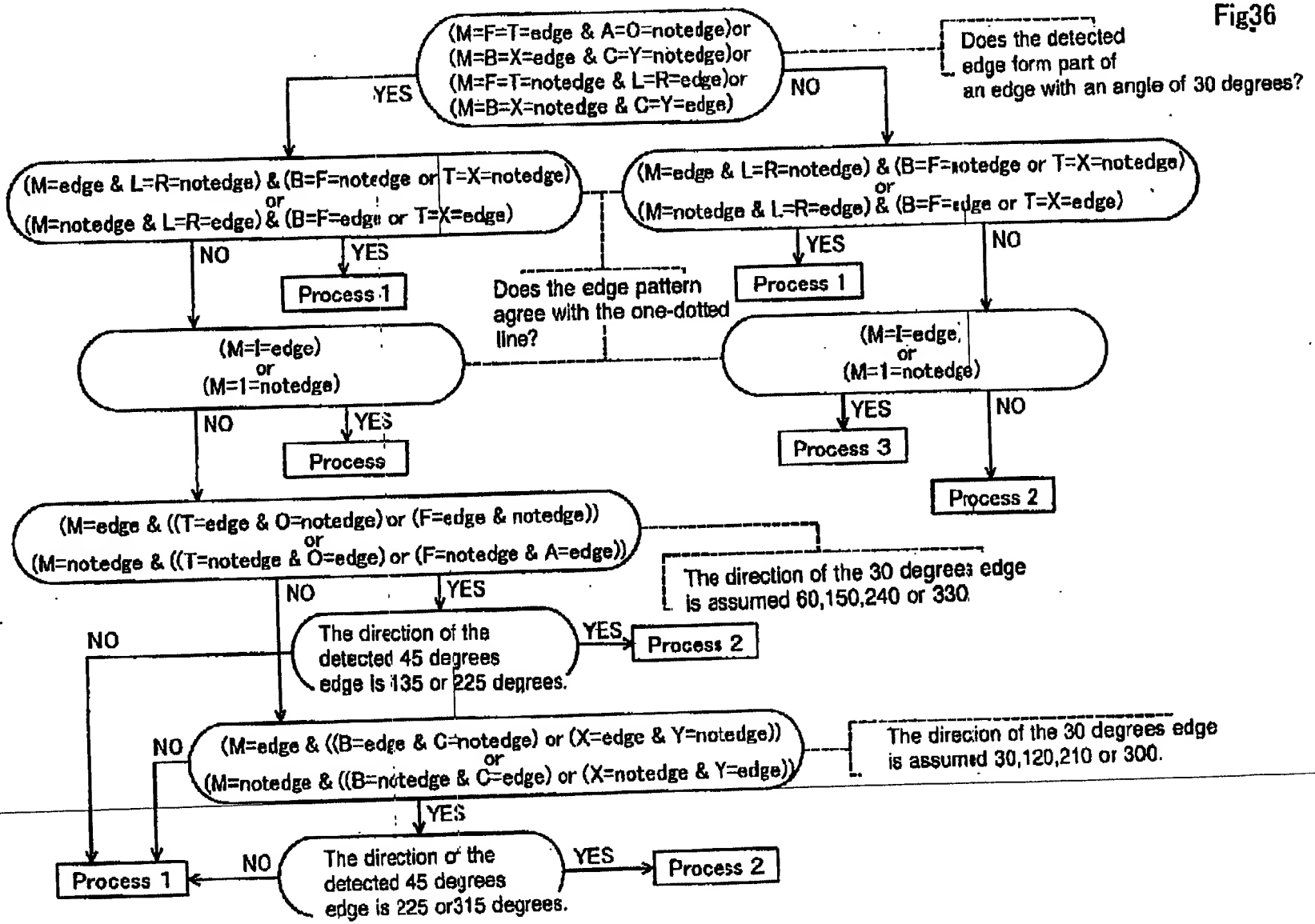


Fig37

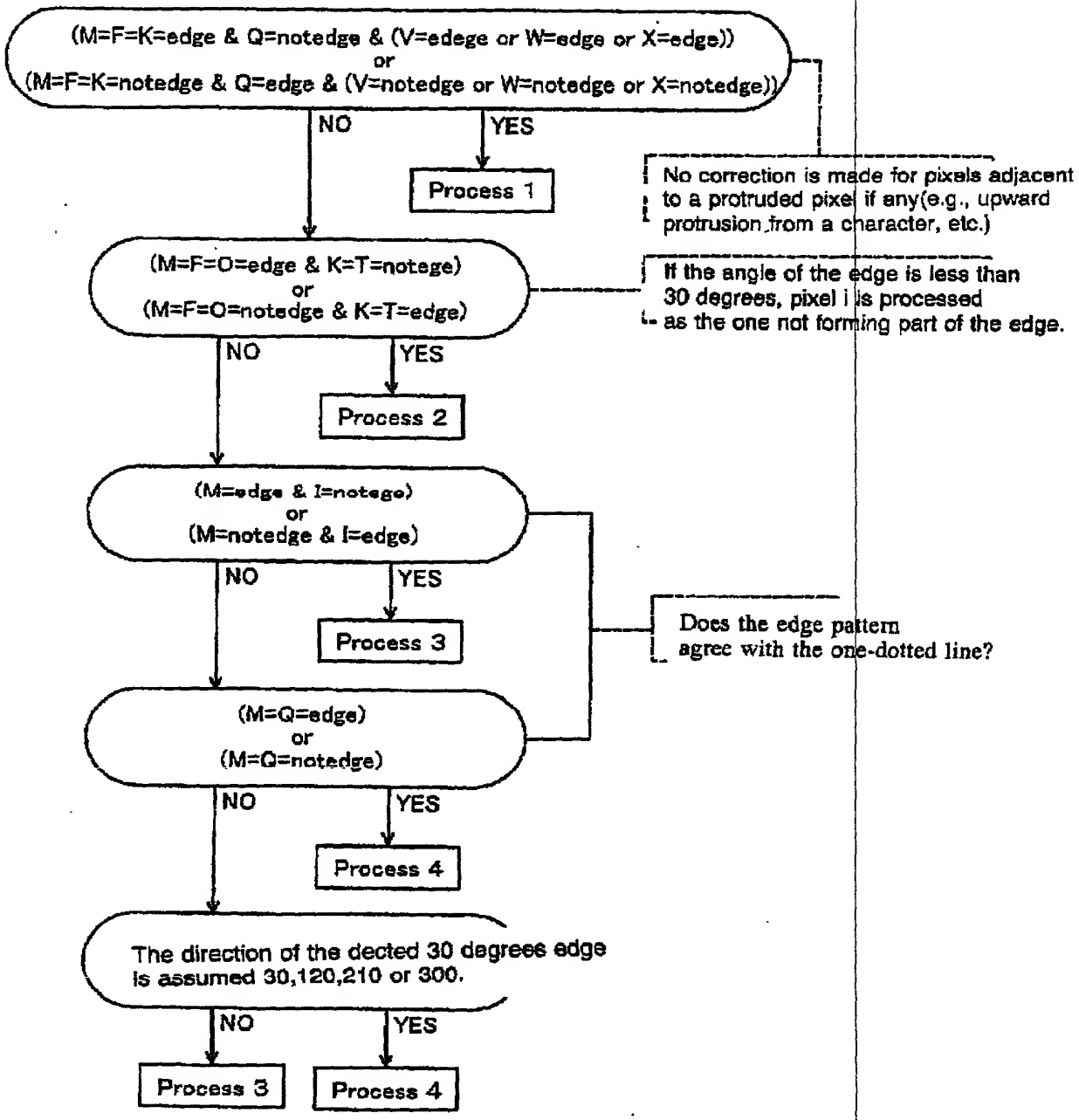

(M=F=K=edge & Q=notedge & (V=edege or W=edge or X=edge))
or
(M=F=K=notedge & Q=edge & (V=notedge or W=notedge or X=notedge))
NO
YES
Process 1
No correction is made for pixels adjacent to a protruded pixel if any(e.g., upward protrusion from a character, etc.)
(M=F=O=edge & K=T=notege)
or
(M=F=O=notedge & K=T=edge)
If the angle of the edge is less than 30 degrees, pixel i is processed as the one not forming part of the edge.
NO
YES
Process 2
(M=edge & I=notege)
or
(M=notedge & I=edge)
NO
YES
Process 3
Does the edge pattern agree with the one-dotted line?
(M=Q=edge)
or
(M=Q=notedge)
NO
YES
Process 4
The direction of the dected 30 degrees edge is assumed 30,120,210 or 300.
NO
YES
Process 3
Process 4

FIG. 38

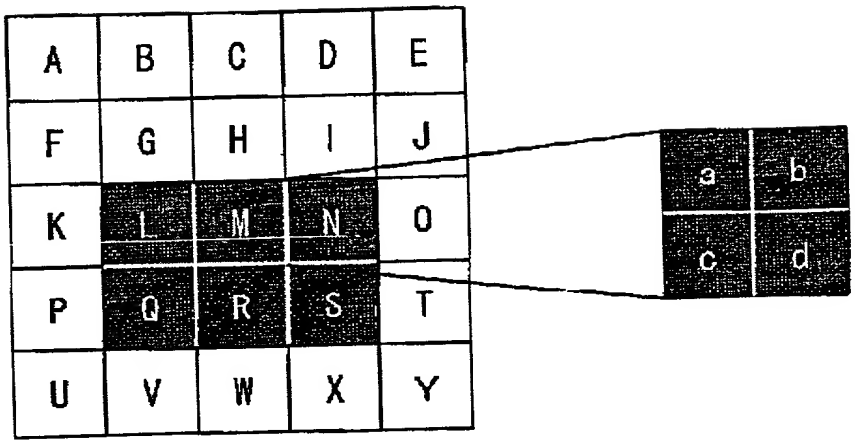


FIG. 39

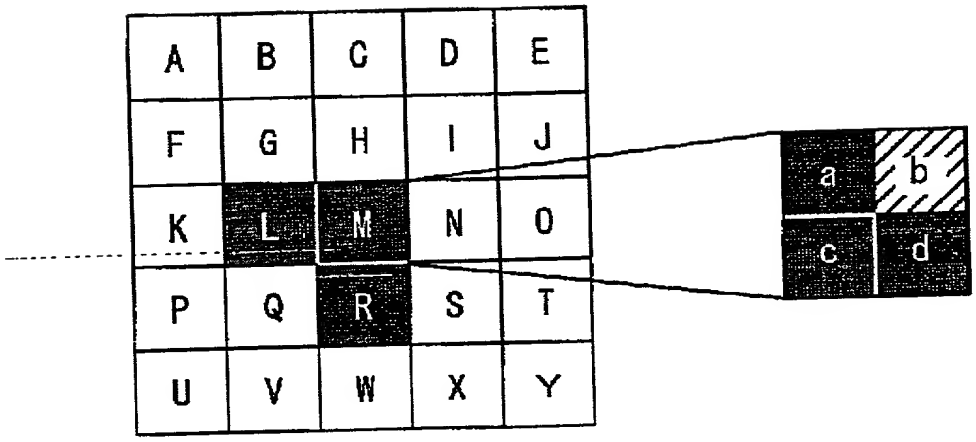


FIG40

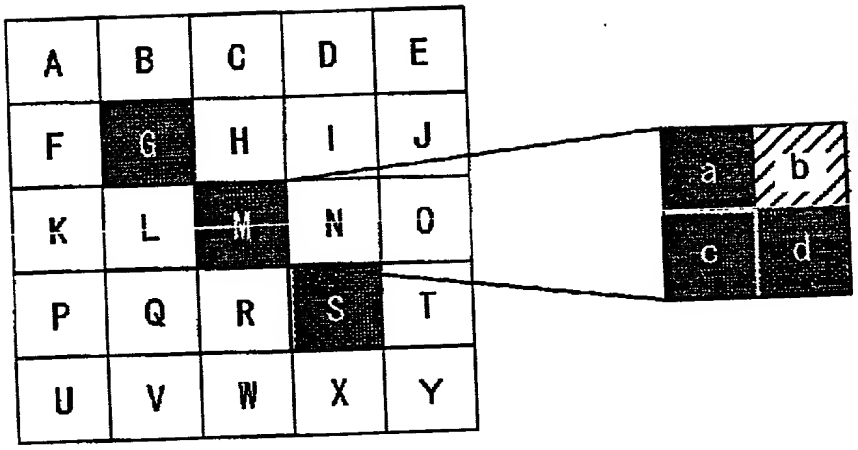


Fig41

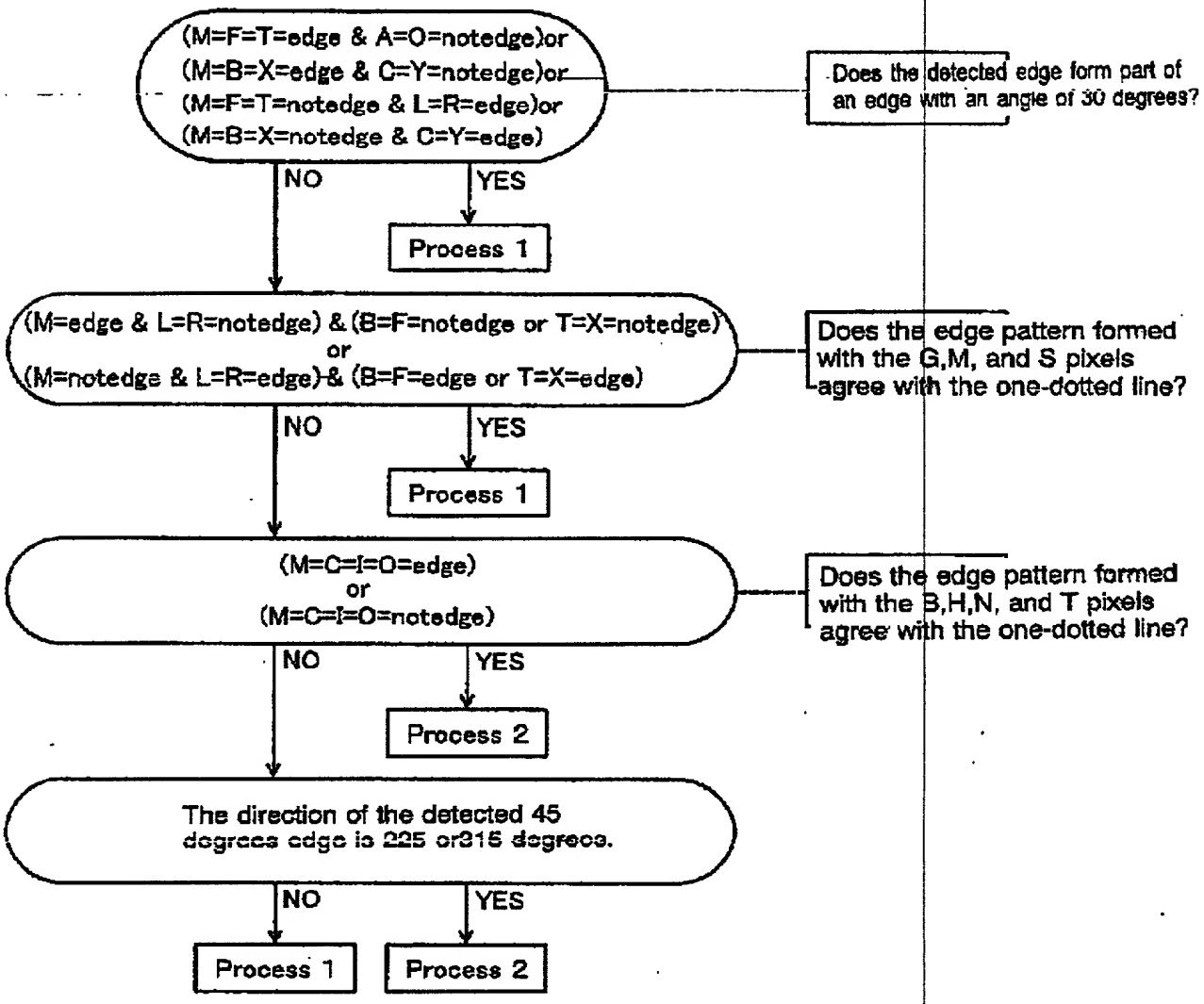

(M=F=T=edge & A=O=notedge)or
(M=B=X=edge & C=Y=notedge)or
(M=F=T=notedge & L=R=edge)or
(M=B=X=notedge & C=Y=edge)
Does the detected edge form part of an edge with an angle of 30 degrees?
NO
YES
Process 1
(M=edge & L=R=notedge) & (B=F=notedge or T=X=notedge)
or
(M=notedge & L=R=edge) & (B=F=edge or T=X=edge)
Does the edge pattern formed with the G,M, and S pixels agree with the one-dotted line?
NO
YES
Process 1
(M=C=I=O=edge)
or
(M=C=I=O=notedge)
Does the edge pattern formed with the B,H,N, and T pixels agree with the one-dotted line?
NO
YES
Process 2
The direction of the detected 45 degrees edge is 225 or315 degrees.
NO
YES
Process 1
Process 2

FIG42

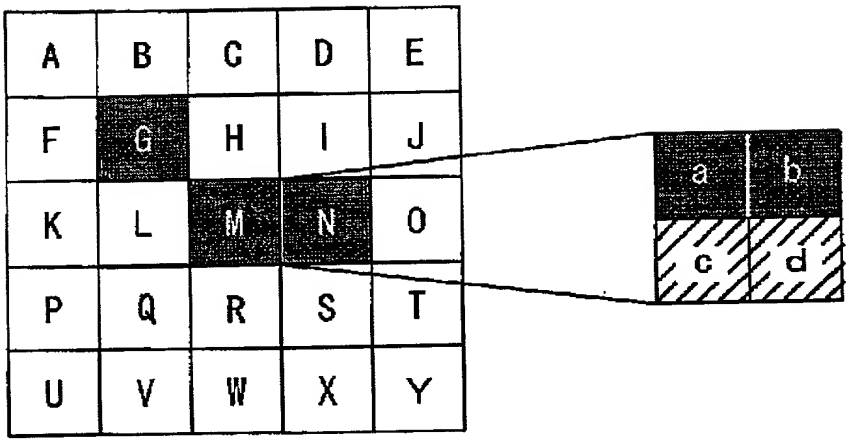
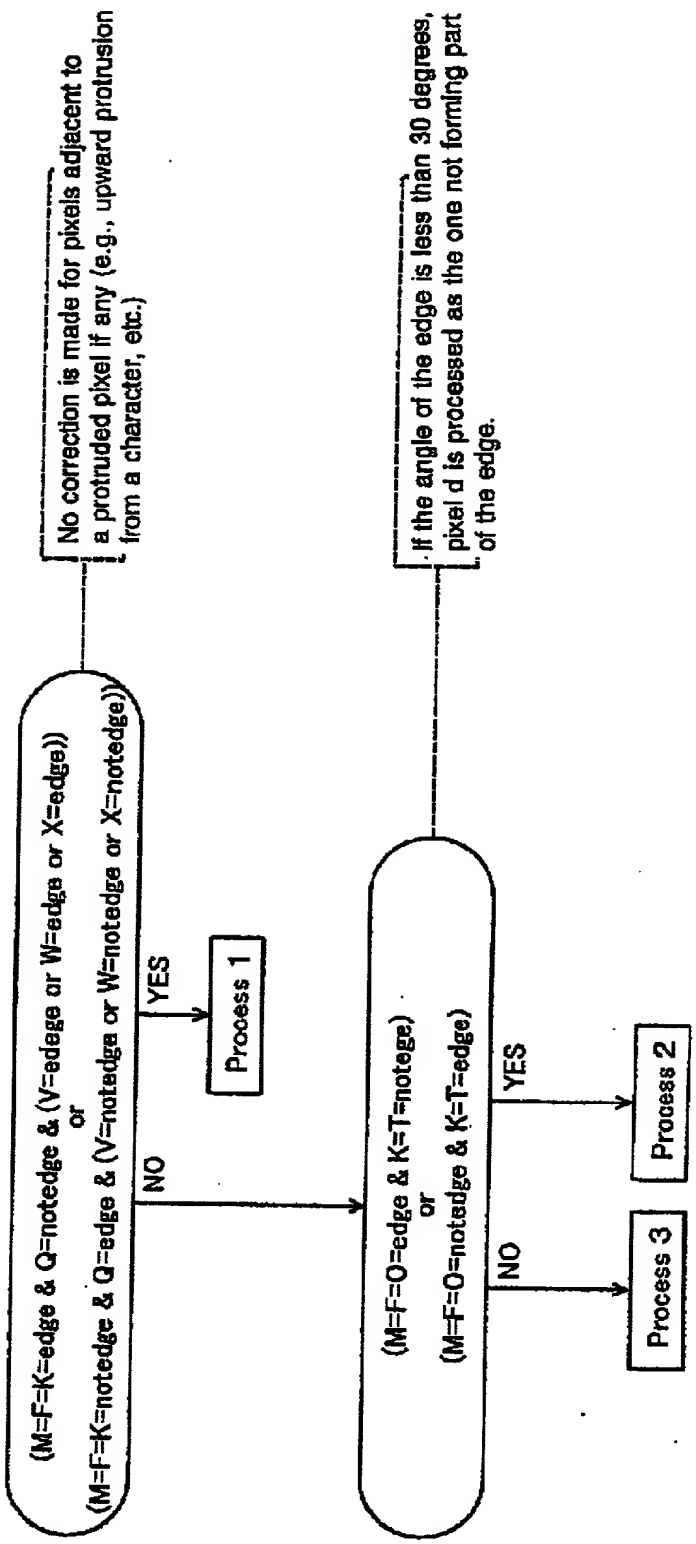


Fig43


(M=F=K=edge & Q=notedge & (V=edge or W=edge or X=edge))
or
(M=F=K=notedge & Q=edge & (V=notedge or W=notedge or X=notedge))
YES
Process 1
NO
No correction is made for pixels adjacent to a protruded pixel if any (e.g., upward protrusion from a character, etc.)
(M=F=O=edge & K=T=notege)
or
(M=F=O=notedge & K=T=edge)
YES
Process 2
NO
Process 3
If the angle of the edge is less than 30 degrees, pixel d is processed as the one not forming part of the edge.